

MATERIALS TOWARD A MONOGRAPH OF THE GENUS AVICENNIA. II

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AVICENNIA GERMINANS (L.) Stearn

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An erect or spreading low shrub or handsome and symmetrical slender tree, to 25 m. tall, sometimes bushy, generally not over 12 or 14 m. tall, usually intermixed with other mangroves but normally exceeding them in height; trunk short, to 50 cm. in di-

iameter; bole crooked, sometimes to 40 cm. in diameter at breast height; roots deep-seated; pneumatophores many, small, erect, about the thickness of a pencil, projecting 5--10 cm. above the water, leafless; stilt-roots absent; heartwood dark-brown, hard, heavy, rough, medium-textured, oily, laminated, close-grained, durable, with the odor of mushrooms when freshly cut, specific gravity (air-dry) 0.95, tending to split at the phloem layers, the grain interlocked; bark varying from black or dark-brown to dark reddish-brown or gray, yellow when scraped, smoothish, sparsely longitudinally cracked or shallowly fissured and rather scaly; branches spreading, crooked; branchlets and twigs slender, often more or less articulate, brownish, more or less tetragonal, often obscurely margined on the angles, glabrous or minutely grayish-pubescent, often shiny, very sparsely lenticellate with scattered corky lenticels; nodes swollen, distinctly annulate; principal internodes 1.5--9 cm. long; leaves decussate-opposite; petioles rather slender, 2--27 mm. long, flattened and canalliculate above, convex beneath, mealy or glabrous, often wrinkled in drying, slightly ampliate at the base; leaf-blades firmly chartaceous or subcoriaceous, sometimes coriaceous, varying from gray- or bright-green to rich- or dark-green and very shiny above, mostly of the same color beneath, but the lamina usually obscured by a whitish furf so as to impart a bicolored appearance to the leaves and these then appearing pale- or gray-silvery or grayish beneath, occasionally brunnescent or nigrescent on both surfaces in drying (especially when the furf is absent), varying from lanceolate or lanceolate-oblong to oblong, elliptic, or obovate, 4.5--15 cm. long, 1.8--4.4 cm. wide, varying from acute to blunt or obtuse at the apex, entire, acute or acuminate to cuneate at the base, glabrous but densely impressed-punctulate above, varying from uniformly and densely whitish- or grayish-furfuraceous or pulverulent-tomentellous (with very closely appressed furf) to glabrous and more or less punctate beneath, the furf apparently deciduous in patches on some forms; midrib slender (or rather stout at the base and rapidly diminishing in size as the apex is approached), usually prominent above (especially toward the apex) or flattened and more or less canalliculate toward the base, prominent to the apex beneath or somewhat flattened toward the base; secondaries slender, 5--10 per side, very irregular, rather uniformly ascending at angles of about 45° and uniformly prominent throughout on both surfaces, very plainly connected some distance from the margins by an equally prominent collective vein; tertiaries few, usually more or less parallel with the secondaries, often obscure above, prominent beneath; veinlet reticulation sparse, mostly obscure or indiscernible above and often also beneath; inflorescence axillary and terminal, spicate, attracting myriads of insects; spikes 1.5--6.5 cm. long, 1--1.5 cm. wide during anthesis, the axillary ones usually confined to 1 pair at the base of the terminal one and shorter than it or another pair in the next lower axils, dense; flowers usually opposite, 1--15 pairs per spike, sessile, sometimes few and distant, sometimes close and decussate or densely glomerate-crowded, small, zygomorphic, 1--2

cm. wide during anthesis, fragrant with a strong or weak aroma, highly nectariferous and attractive to honeybees; bractlets and prophylla light-green, ovate or oblong, sessile, closely appressed to the calyx, obtuse or acute at the apex, densely sericeous-pubescent with cinereous appressed hairs on the outer surface; calyx light-green, the lobes ovate, 3--5 mm. long, 2--3 mm. wide, densely appressed-pubescent on the outside, glabrous within; corolla campanulate, varying from pure- or pale-yellow to cream-colored or white, apparently yellow when first opening and later turning white, sometimes white with a yellow throat or cream with an orange throat, occasionally creamy on the lips and brown below, 12--20 mm. long and about 10 mm. wide, parted to about the middle, the tube equaling or shorter than the calyx, practically glabrous, the lobes 4, spreading, unequal, 2--2.5 mm. long, oblong or subquadrate, rounded at the apex, densely cinereous-pubescent on the outer surface with appressed hairs, velutinos-tomentose within, finally so completely reflexed as to touch the corolla-tube; stamens slightly exerted from the corolla-tube, included by the lobes, finally blackish and conspicuous when the corolla-lobes become completely reflexed; pistil as long as the stamens; stigma bilobed, finally conspicuous when the corolla-lobes become completely reflexed; fruiting-calyx enlarged, but not at all incrassate or indurated, 5-parted practically to the base, about 9 mm. in diameter, each lobe ovate-lanceolate, about 4 mm. long, about 2 mm. wide at the base, acute at the apex, densely short-strigose with appressed white or gray hairs, wide-spreading, glabrous and shiny within; fruit a soft, thin-walled, yellowish capsule, oblong or elliptic to more or less obpyriform or ovate and asymmetric, 1.2--5 cm. long, 7--13 mm. wide, often turning almost plum-color when exposed to the sun, apiculate at the apex when young, densely white- or gray-pulverulent or sparsely pubescent throughout, often also more or less white-strigose (especially at the apex and on the apiculation), opening longitudinally, containing one large seed with big cotyledons that are greenish with a dull-purplish tinge; hypocotyl almost as long as the inner cotyledon, pubescent for almost its whole length, without visible side-rootlets in fruit; plumule not visible to the naked eye.

This very common species is found from Florida and Texas in the United States, Bermuda, and the Bahamas, throughout the West Indies, both coasts of Mexico, through Central America, to the coasts of Brazil and Peru; also in the Galapagos and other islands off the coasts of tropical and subtropical America.

The type of this very common and apparently highly variable species was collected by Patrick Browne in Jamaica, and is deposited in the Linnean Herbarium (813.2) in London. Linnaeus based his Bontia germinans on Browne's Jamaican plant and on a collection made by Pehr Löfling probably at Cumaná, Venezuela, but Stearn, when he transferred the taxon to the genus Avicennia, restricted the typification to the Jamaican collection. Linnaeus' original description is "B. fol. oppositis, pedunculis spicatis. Brown. jam. 263. Loefl. hisp. 193". Browne described his plant as "Olive Mangrove Tree***frequent near the sea, both on the

north and south side of Jamaica; and remarkable on account of its cineritious colour, and the narrow form of its leaves." As Stearn has pointed out, "Browne stated that 'its capsules are compressed, and somewhat roundish; but irregular, and obliquely lengthened; and contain each a compressed foliaceous seed, that swells and germinates before it falls.' From this observation and Browne's description, 'semen unicum quadrilobum germinans, lobis foliaceis', Linnaeus took the appropriate epithet germinans. The description in Löffling's Iter Hispanicum, 193 (1758), under Bontia, does not allude to this viviparous habit. Hence it is reasonable to typify the name Bontia germinans by Browne's specimen in the Linnaean Herbarium." Stearn goes on to point out that "In the second edition of the Species Plantarum, 2: 891 (1763) Linnaeus's concept of Bontia germinans expanded to include the Avicennia officinalis of the first edition, 1: 110 (1753); the distribution 'in India' thus covers both the East and West Indies." Herein Linnaeus erred, since A. germinans and A. officinalis are quite distinct.

It is worth mentioning here that Record & Hess, in the reference cited above (1943) reduce A. nitida to synonymy under the east African and tropical Asian A. marina (Forsk.) Vierh. Montealegre & Hogg, in an article entitled "Las selvas de Costa Rica" in Revista del Instituto de Defensa del Cafe de Costa Rica, vol. 15, no. 131, page 571 (1945) state that Avicennia marina is the correct name for the American species as found in Costa Rica, and that A. nitida is an Asiatic tree! This statement is apparently copied from Merker, Barbour, Scholten, & Dayton's "Forests of Costa Rica", page 67 (1943). How these authors ever came to this amazing and entirely erroneous conclusion is inexplicable to me.

It has been suggested by early authors that the Cynoxylum americanum folio crassiusculo mollis & tenaci Pluk., Alm. 127 Phyt. pl. 172, fig. 6 (1696) may be this plant, but Plukenet's plant is actually Nyssa aquatica L., in the Nyssaceae. His drawing shows definitely alternate oblanceolate leaves.

A. nitida is regarded as both American and west African by Briquet (1894), Walter & Steiner (1936), Standley (1938), Questel (1941), Darlington & Janaki Ammal (1945), and Stearn (1958). J. G. Baker (1900) keeps the African material separate as A. africana P. Beauv., but notes "Perhaps not distinct specifically from the American A. nitida, Jacq." Schauer (1851) keeps A. africana apart definitely, saying "Proxima Av. nitidae diversa tamen: foliis obtusis, supra minus nitidis (neque siccitate nigrescentibus) subtus neque niveis neque (quantum equidem cognovi) calvescentibus."

Standley (1938) says it is "Abundant in mangrove (Rhizophora) swamps of the Pacific coast, and doubtless also of the Atlantic. Widely distributed in the tropics of both hemispheres." Beard, in his paper entitled "Climax vegetation in tropical America" in Ecology 25: 130 (1944) affirms that "The mangrove association Rhizophora mangle - Avicennia nitida - Laguncularia racemosa ranges throughout the tropical Atlantic seacoasts of Africa and

America."

The types of A. nitida Jacq. and A. tomentosa Jacq. are both Herb. Jacquin s.n. specimens deposited in the herbarium of the British Museum in London, the former having the leaf-blades glabrous and the latter having them densely furfuraceous-tomentelous beneath. The two forms, when thus viewed from isolated specimens, certainly do appear distinct. Grisebach (1866) records both A. nitida and A. tomentosa from Cuba. Lamarck distinguishes the two as follows: A. nitida - "foliis lanceolatis, acutis, utrinque nitidis", and A. tomentosa - "foliis ovato-oblongis, subtus tomentosis". He cites Jacquin's fig. 1 for the former and fig. 2 for the latter and includes Oepata Rheede in the latter's synonymy. Oepata, however, is a synonym of A. officinalis L.

The type of A. nitida Sessé & Moc. is Sessé, Mocino, Castillo, & Maldonado 2188 from Mexico, that of A. elliptica is Westin s.n. from Brazil in the Thunberg Herbarium, of A. tomentosa var. cumanensis is Humboldt [Bonpland] 68 in the herbarium of the Botanisches Museum at Berlin, of A. tomentosa var. guayaquilensis is Bonpland s.n. from Guayaquil, Ecuador, in the herbarium of the Muséum National d'Histoire Naturelle at Paris, and of A. tomentosa var. campechensis is Bonpland s.n. from Campeche, Mexico, in the same herbarium. The type of A. officinalis var. lanceolata is Kuntze s.n., collected in April, 1874, in Trinidad, deposited in the Britton Herbarium at the New York Botanical Garden. The type of A. tomentosa Sieber (in part) and of A. lamarckiana is Sieber Fl. Mart. 318 from Martinique. The type of A. floridana Gandoger is A. S. Hitchcock 270 from Lee County, Florida.

It is worth mentioning that Presl, in his Bot. Bemerk. (1844), refers to an "Avicennia tomentosa" of Sieber, Fl. Trin. on pp. 98--99, which is A. germinans, and Fl. Nov. Holl. on p. 99, which is A. marina var. resinifera (Forst.) Bakh.

Kuntze's original description of his A. officinalis var. lanceolata is "folia late lanceolata (1:±3)", and he adds "Auch in den anderen Erdtheilen innerhalb der heissen Zone nicht selten."

Numerous illustrations in addition to those cited above are purported to depict this species, but examination shows them to be misidentified. For instance, the "Avicennia nitida" illustrated in Vell., Fl. Flum. 6: pl. 56 (1827) is actually A. schaueriana Stapf & Leechman, and that in Engl. & Drude, Veget. Erde 9 (1): 2, pl. 45 (1910) is A. africana P. Beauv. The illustration of "A. tomentosa" in Wall., Pl. Asiat. Rar. 3: pl. 271 (1832), Wight, Ic. Pl. Ind. Or. 4: pl. 1481 (1849), Wight, Illustr. Ind. Bot. 2: pl. 173 bis (1850), Schnitzlein, Iconogr. 2: pl. 137** (1856), Baill., Hist. Pl. 11: 88 (1891), Schimper, Bot. Mitt. Tropen 3: pl. 6, fig. 2 & 3 (1891), Briq. in Engl. & Prantl, Nat. Pflanzenfam. 4 (3a): 181 (1895), and Wettstein, Handb. Syst. Bot., ed. 2, 739 (1911) are all A. officinalis L. The "A. tomentosa" illustrated in Blanco, Fl. Filip., ed. 3, 2: pl. 74 (1878) is A.

marina var. rumphiana (H. Hallier) Bakh., while that in Wettstein, Veg. Studbras. pl. 17 & 18 (1904) is A. schaueriana. I have not been able to verify the identity of the plant illustrated in Neger, Biol. Pflanz. 352 (1913).

The Guapira Aubl. and Gynastrum Neck. cited by Schauer in Mart., Fl. Bras. 9: 304 (1851) as synonyms of this species are actually synonyms of Pisonia L. in the Pisoniaceae. In Phytologia 7: 167 I dated Griseb., Fl. Br. W. Ind. 502 as "1864" -- this is an error, the correct date for the page in question is 1861.

Quite a few specimens -- including Sessé, Mocino, Castillo, & Maldonado 2189, A. A. Eaton 908, Debeaux 73 (in part), Trin. Bot. Gard. Herb. 5405, and some of the W. E. Broadway s.n. collections -- have been identified and distributed as Avicennia nitida, but are actually Laguncularia racemosa (L.) Gaertn. f. in the Combretaceae. Gaumer 635 was identified and distributed as A. officinalis, but is in part A. germinans and in part Laguncularia racemosa. Material of A. germinans has often been misidentified as "A. tomentosa L." [which is A. marina (Forsk.) Vierh.] and even as "Diospyros eteni". Johansen s.n. was distributed as Rhizophora mangle L., Schomburgk 845 as Drepanocarpus inundatus Mart., Schott 473 as "Myoporaceae", and Berg s.n., Herb. Mus. Bot. Lund. s.n., and Collector undesignated s.n. [St. Croix] as Conocarpus erecta L. Galeotti 2686, Tamayo 893, Reynolds s.n., and the A. Stewart collections from the Galapagos Islands, among many others, were misidentified and originally distributed as A. officinalis. The Collector undesignated 58 specimen at Madrid, said to be from French Guiana, looks strikingly much like A. africana, and may very possibly have come from French Guinea rather than French Guiana.

Our species is recorded by Berry (1925) in the fossil form from Pleistocene formations in Trinidad. The Herb. Forest Dept. F. M. S. 2767 erroneously cited as "A. nitida" by me in my Alph. List. Cit. 2: 353 (1948), is actually a cotype of A. lanata Ridl.

A. germinans is a very common species in the mangrove swamps of the New World, especially on their landward side. Collectors have recorded it from mangrove thickets, the edges of mangrove thickets, in swamps and at the edges of swamps, along rivers, on beaches, in tidal flats and bordering tidal flats, in serpentine marshes, on low islands and shores, in lagoons and the borders of lagoons, in low marshes, at the mouths of lagoons, in dense tidal forests, in the arid coastal belt, along the seacoast, at the water's edge, in salt lakes, in sandy flats near the water-line of bays, in sandy-salty soil, in and around salt marshes and in tidal marshes, in mud at the head of sea lagoons, and in low calcareous soil. In Florida it is frequent along roadsides on the keys; Stewart says it is common on the beaches and around a salt lake on Charles Island in the Galapagos. Box reports that it grows in the inner zone of mangrove swamps and coastal mud-flats, generally in pure societies, covering large areas. In El Salvador

it has been found on a hillside along the beach. It has been collected at altitudes from sea-level to 15 meters. It very often grows in association with Rhizophora mangle L. Curran reports that he found it in "fresh water" in Pará, Brazil. Taylor says that on Indefatigable Island "this is the less frequent of the mangroves, which are almost all Rhizophora; this forms tall trees (40—50 ft.) which show up above the shrub vegetation of the adjacent dry belt (only tree of any size there being Opuntia and a few Piscidia erythrinia)". Schipp notes that it is plentiful in tidal flats in British Honduras, the wood being hard and close-grained, good for knees in boat-building. Ferris reports that in Baja California it grows in association with Rhizophora, Laguncularia, Batis, and Maytemus. Rimbach states that in Guayas its wood is used for construction purposes and the tree "forms woods in back of the mangrove.....on low salty ground which becomes inundated only by the high tides." Standley reports it as abundant in Izabal, Guatemala. The Lundells affirm that in Yucatán it is "a dominant in mangrove swamps bordering cienaga." Little says it is "common in scattered patches, with scattered trees at edge of water" in Ecuador. Egler asserts that it forms a zone at the edge of bare sand in the saline arid zone in Martinique, being "a common tree of the mangroves, naturally occurring in a broad zone landward of Rhizophora, on sand or clay; palatable to stock; now widely destroyed because of cutting and grazing."

Sudworth gives the range of the species as "Florida coast (from St. Augustine to the southern keys on the east coast and on the west coast from Cedar Keys to Cape Sable); Louisiana (islands in Mississippi Sound and on coast in Cameron and Terrebonne Parishes)." Runyon refers to it as "rare" in the Brownsville area of Texas.

Lundell (1942) says that it is one of the principal species above the tidal area in British Honduras. I. M. Johnston reports that in Baja California it is "a frequent tree in saline soil usually at or about high-tide mark". His "San Evaristo Bay" specimens are from a bay on peninsular Baja California, on the Gulf side, below the middle. Other localities for the species in that region are given by him in Proc. Calif. Acad. Sci., ser. 4, 12: 1152 (1924). Bailey found it "at El Camote, Oaxaca, inland from Chacahua, on shore of laguna". Runyon describes it as a "handsome shrub for salty ground." Spalding says "of small size on the flats and in shallow water between New Smyrna [Florida] and the Peninsula. Apparently its northern limit. Freezes are reported to have killed the mangroves at this point. Much dead brush was still to be seen [March, 1902]." For a description of the habitat of this species in Florida as compared with the two other species of Floridian mangroves, see John H. Davis in Fla. Geol. Surv. Bull. 25: 187—192 (1943) and Carnegie Inst. Wash. Publ. 517: 303--412 (1940) — the first paper is entitled "The natural features of southern Florida especially the vegetation, and the everglades", while the latter is "The ecology and geologic role of mangroves in Florida."

Cañas (1937) reports that the resin of this plant is very useful in the treatment of ulcers and tumors, diluted in a grease or, better, vaseline, at 30 percent. Choussy says the gum is an irritant, used by the natives of El Salvador for afflictions of the throat. An unknown collector in the West Indies reports that the roots and unripe fruit are used medicinally there. Johansen says that "the wood is of great strength, used in construction of houses in Puerto Rico, turns red when submerged in water and is then practically incorruptible, makes a fine grade of charcoal, and bark used for tanning leather." It is worth noting, however, that he determined the specimen concerning which he records these facts as "Rhizophora mangle", so it is very possible that some of his comments, at least, apply to that species rather than to Avicennia germinans. Elias, however, also reports that the wood is "used for firewood, to make charcoal, and the bark for tanning leather." Mexia reports that the species is employed for firewood in Nayarit, Mexico. Jennings reiterates that the wood is very resistant under water and the bark is used for tanning. Perez Arbeláez reports the gum used for infirmities of the chest in Colombia. Fróes found the wood being used for marine construction in Brazil. Miranda (1952) notes "la corteza se usa como curtiente" in Chiapas, Mexico. Merker reports that the species is "little used in Costa Rica except for firewood".

Roig (1945) says "Según Gómez de la Maza, la resina...la usan como alimento los neo-holandeses y las hojas verdas, cocidas con las hojas verdes de la Ipomoea campanulata L. sirven para hacer cataplasmas emolientes. Agrega que los árabes usan la raíz mucilaginoso y salada de esta planta como afrodisíaco, propiedad que debe a su acción corroborante y dinamófora. Del Avicennia nitida Jacq. dice lo siguiente: 'Astringente, sucedáneo de Mangle blanco. Hase usado como febrífuga.' Las hojas de esta planta son aromáticas, así como sus flores que son muy visitadas por las abejas. Esta es una de las especies que nos han dicho que producen la resina medicinal llamada Cativo mangle, cosa que no hemos podido comprobar. Según Cañas, las resina es muy útil para las úlceras y tumores, diluida en una grasa, más bien vaselina, al 30 por ciento. En Yucatán, Méjico, emplean el cocimiento de la corteza, tanto al exterior como al interior, contra hemorroides, heridas y diarreas. La goma que exuda el tronco es eficaz para curar las enfermedades del pecho, según P. Arbeláez." Of course, the Australian and Arabian plants referred to here cannot be this species, and are probably A. marina (Forsk.) Vierh.

Roig (1953) says "Su madera es excelente, de color pardo oscuro, muy duradera & dura. Se la emplea en horconaduras, diques, muelles y toda clase de construcciones navales por su resistencia a la acción de las aguas. En las construcciones rurales puede usarse bajo techo. En San Luis, Pinar del Río, dicen que la resina que brota del tronco es el bálsamo de cativo mangle. Las flores son olorosas y son visitadas por las abejas. No es estimada esta planta para fabricar carbón vegetal."

Terrac (1947) notes that this species is an "Arbuste de la mangrove à écorce astringente. Le bois renferme 17% de lapachol."

Root & Deyell (1945) give an interesting account of this species as a source of honey in Florida. "In Florida it is not found to much extent north of Ormond on the east coast. It usually grows back of the red mangrove, and in the localities where both grow together the red mangrove fringes the shores and makes new land. But black mangrove is the honey plant. The honey is light colored, but the flavor has a tang that many do not like. It is sometimes blended with palmetto.....The wood is dark brown and very durable in contact with the soil. When used as fuel it burns with intense heat. Up to the year of the 'big freeze', in 1894, phenomenal yields were reported. As much as 400 pounds of honey from one hive in a single season has been recorded. It was hardly possible then to overstock a mangrove section in a favorable season. But the severe winter of 1894 froze and killed the mangrove to the ground. It did not recover from this check for 18 years, and not until 1909 did it again yield nectar, and then only in small quantities. Since that year the bushes have gradually grown in size and the yields have increased also, but as yet they cannot even be compared with those preceding 1894.

"On the numerous small islands of Indian River and along the east coast of Florida southward from Ormond, there are thousands of acres of black mangrove from six to fifteen feet tall. There are a few beekeepers located in the mangrove swamps of southwestern Florida, but not so many as on the east coast, as at Ariel and at New Smyrna. At Cocoanut Grove.....a mixture of mangrove and cocoanut honey is secured, which is much lighter than the mangrove honey alone.....There are also a few colonies of bees in the vicinity of Everglades.....At Punta Gorda on the west coast black mangrove begins to bloom May 1st until July 15th or a little later. When atmospheric conditions are favorable the nectar can be seen in large drops shining in the little cups, and a bee can obtain a load from a single blossom. According to Frank Stirling of the State Plant Board of Florida, the honey is dark colored and is used very largely in the manufacture of sweet cakes. On the east coast it is usually blended with the honey from cabbage palmetto, which blooms at the same time, and is in consequence lighter colored but thin and not very sweet, with a salty or brackish taste.....

"The secretion of nectar is greatly influenced by the weather. In 1911 near New Smyrna it yielded well early in the season, and the bees left their hives for the mangrove swamps almost before dawn, hurrying across the coves of salt water the entire day; but after two weeks the weather suddenly changed and hardly a bee was seen again on the blossoms, although they still continued to open. At Punta Gorda in 1919 the crop of mangrove was very small, but in 1918 it probably exceeded 100 pounds per colony. In the same year a beekeeper below Ft. Myers reported the crop a failure!

In their 1923 work the Roots give some additional interesting information: "....the red mangrove fringes the shore and makes new land, while the black mangrove is a soil-former. Both are valuable in catching drift and lodging humus and gradually transforming the shallows into reefs and islands and finally into sol-

id land. But the black mangrove does not actually grow in the water. The black mangrove, when it grows to the size of a tree, resembles a scragly old oak with a rough brown bark. It may be 25 to 50 feet tall with a trunk diameter of four feet, or on the Keys it may attain even greater size. Northward it is seldom more than a shrub....The wood...when used as fuel....burns with intense heat, As a source of honey the black mangrove has attracted more attention than any other tree in Florida....In earlier days migratory beekeeping was in practice, and many colonies of bees were moved to the vicinity of Hawks Park from points up and down the coast and from inland localities 50 miles distant."

In their 1920 work they report that "The flowers are inconspicuous, of a yellowish-green hue, blossoming in a spike or head, the same flower stalk carrying both old and new blossoms at the same time. This peculiarity lengthens out the bloom-period very considerably, which lasts from six to eight weeks in most favorable seasons. The wood closely resembles ebony in color and weight...and burns with a peculiar crackling sputter. The stove door must not be tightly closed in burning the wood or it will not burn steadilyIt is the whitest honey in Florida, with perhaps the single exception of cabbage palmetto. The body is rather thin, tho better in that on the Keys than on the mainland. In flavor it is very sweet and mild and has just the barest suggestion of brackishness about it, due either to the soil or the vicinity of the salt marshes. The brackishness is not at all objectionable. The honey is usually pronounced first class, and ranks with the four best honeys of Florida -- namely, the white tupelo, the orange, the scrub palmetto, and the mangrove. Up to....1894 it was without exception the greatest yielder of honey of any plant in the world!"

A species with as wide a geographic distribution as this one may be expected to have a great many common names and vernacular names. Included are "algarrobo", "apalioe", "arbor de sal", "avicenne cotonneux", "avicenne luisant", "black mangrove", "black-mangrove", "blackmangrove", "black tree", "blacktree", "black wood", "blackwood", "black wood bush", "blackwood bush", "blak mangrove", "bois de mêche", "button mangrove", "canóa", "carnôé", "cativo mangle", "cereibuna", "cereitinga", "chifle de vaca", "ciriuba", "columnate", "conrida", "courida", "cowrida", "culumate", "false mangrove", "glänzender Salzbaum", "green turtle bough", "guapirá", "guapirú", "honey mangrove", "honey-mangrove", "iguanero", "ishtaten", "ishtatén", "istaten", "istatén", "koroda", "mangel", "mangel blanco", "mangle", "mangle blanc", "mangle blanco", "mangle bobo", "mangle chéne", "mangle iguanero", "mangle negro", "mangle prieto", "mangle rosado", "mangle salado", "manglesito", "manglier noir", "manglo salado", "mangrove", "mangue", "mangue amarelo", "mangue-amarelo", "mangue amarillo", "mangue branco", "mangue-branco", "mangue ciriuba", "manguel blanca", "mangue seriba", "mangue seriva", "mangue siriba", "olive mangrove", "olive-mangrove", "olive mangrove tree", "paléluvier", "paleo de sal", "palétuvier", "palétuvier blanc", "palétuvier gris", "palétuvier rouge", "palo de sal", "palo de sol", "palo do sal", "paltuvier gris", "pao de

caranguejo", "páo de caranguejo", "pariva", "parwa", "parwaboom", "pére", "péré", "puguaeje", "puguaeje", "puyece", "puyeque", "saladillo", "saltbushes", "salt pond", "salt-pond", "saraiba", "seriba", "sereiba", "seriuba", "sireiba", "siriba", "siriuba", "siriúba", "siruva", "white Brazil mangrove", "white mangrove", and "witte mangrove". Cañas reports that the name "cativo mangle" is applied to this plant erroneously in Cuba. Likewise, it is probable that the names "white Brazil mangrove", "white mangrove", and "witte mangrove" are applied erroneously, since they belong more properly to Laguncularia racemosa, with which our plant is often confused. The name "button mangrove", similarly, really belongs to Conocarpus erecta.

The physico-chemical properties of the sap of A. germinans in relation to phytogeography are discussed by Harris in the 1934 reference cited above. Ovary sections are shown by Junell on p. 141, fig. 222, of the 1934 reference above. Scholander, in Am. Journ. Bot. 42: 92-98 (1955), discusses the methods of gas exchange in the roots. The pneumatophores are well illustrated in Nature 144: 964, fig. 3 (1939). Allen reports that the species has "stilt roots" in Panama, but this is very probably an error in observation. My friend, Dr. I. L. Wiggins, says that in collecting material of this plant in Baja California salt crystals formed densely on the leaves after they were dried and that overnight these deliquesced to as to soak the botanical driers again. He recommends that the crystals be washed off by dipping the specimens in a stream after they have formed, and then re-drying the specimens in the normal way.

Gentry in Allan Hancock Pacif. Exped. 13 (2): 78 (1949) cites Elmore 1B2 from Marie Magdalena Island, but this collection has not yet been seen by me. Luetzelburg (1923) records the species from Parafba, Sergipe, and Rio de Janeiro, Brazil, but it is not certain if he refers actually to this plant or to A. schaueriana. Alain (1946) refers to it as a "neo-tropical" species, which, in my opinion, is correct. The Little 6750 [Forest Service 98495] sometimes cited as from Bolívar, Ecuador, was actually collected in Guayas. The original labels were incorrectly written, as has been explained to me by the collector himself in a letter dated May 31, 1946. Chapin reports that Crospiza fortis often nests in this tree on the Galapagos Islands. Stehlé (1937) points out that this species and Rhizophora mangle grow together in Guadeloupe under very special conditions of salinity, humidity, etc., and are characterized by their rapidity of germination. I. E. Stewart (1954) reports that both sexes of the common saltmarsh mosquito (Aedes taeniorhynchus) feed on the nectar of this species, especially immediately before and after the male swarming periods and if no nectar from this plant or from spanish-needles, cabbage palm, saw palmetto, button mangrove, or sea-grape or honeydew from green aphids is available at the breeding site, migration is likely to occur.

A sheet of Hostmann 1140 in the Delessert Herbarium at Geneva is inscribed as having been collected in British Guiana, but un-

doubtedly came from Surinam. Box, in his manuscript Flora of Antigua, cites Douglas s.n. in the Sloane Herbarium at the British Museum, Wulfschlägel 438 at Munich, and Gregory s.n. at the British Museum from Antigua [the last-mentioned being from "Five Islands"], and Box & Charter s.n. [May, 1937] from Barbuda. Of these, I have thus far seen only the Gregory and Wulfschlägel specimens.

Cuatrecasas in Bol. Soc. Bot. Mex. 23: 85 & 94 (1958) describes an ecologic formation called "Avicennietum nitidae". Seymour reports that the species is attacked by the fungus Irene sepula (Pat.) Toro [Meliola sepulta Pat.]. Houard, in Zoocéd. Pl. Amer. Sud 352--354 (1933) reports that it is infested by two species of cecidomyiids — one undetermined from Brazil and the other determined as Cecidomyia avicenniae by Cook from Cuba -- and by an unidentified species of eriophyid from Brazil. In Guiana he reports that it is infested by Erineum croceum Fée and in Dominica by E. pallidum Kunze. In fact, in the introduction of his work he points out that insect galls are found quite abundantly on the leaves of Avicennia, especially in Cuba. Such galls are shown on the Smeathman specimen in the British Museum herbarium.

Shafer collected seedlings in October in Cuba, and Rhodes did the same in October in Florida. The species has been collected in anthesis in every month of the year, and in fruit from July to October. The specific portion of the name A. nitida is often upper-cased without justification. The collector Salzmann's name is misspelled "Saltzmann" on some labels, while Hostmann's name is given as "Hortmann" in the Paris herbarium.

V. J. Chapman, in Journ. Linn. Soc. Lond. Bot. 52: 429 (1914) says: "The species is viviparous, as germination takes place in the fruit. A single tree will produce about 300 seeds per annum, the maximum production coming from trees growing on clay. Guppy (1917) has recorded that seedlings will retain their vitality for 25 days with partial drying and after 50% of their water has been lost. The bark contains about 12% of tannin which is not sufficient to make it satisfactory for commercial use. Control of the osmotic pressure in the tissues of this species is probably secured by means of the salt-secreting glands which are to be found on the leaves. In the northern hemisphere this species is to be found in the same localities as Rhizophora mangle, except that it does not penetrate to the Pacific Islands. On the shores of tropical West Africa it is to be found from Senegal to Port Congo. The appearance of the species is slightly different on these shores and it has been known as Avicennia africana P. Beauv., but it does not seem sufficiently distinct to warrant segregation as a separate species. If the western mangroves originated in West Africa then var. africana would have to be regarded as the parent species. A. tomentosa Jacq., which is distinguished from A. nitida by broader leaves and sessile stigmas, is said to grow in a few Caribbean islands, and though recorded from Jamaica it was not seen in the vicinity of Kingston. Ridley (1936) reports New Guinea as the home of A. tomentosa, but it has probably been con-

fused here with another species. Ridley in a letter informs me that his plant is distinct and will have to receive another name. Schimper, on the other hand, restricts A. tomentosa to South America. The nature of the characters separating it from A. nitida suggest that it really should be regarded as a variety of that somewhat polymorphic species." Of course, the New World "A. tomentosa" here referred to is in part A. germinans and in part A. schaueriana. It is worth noting here that Rhizophora mangle L. has also been described as occurring in West Africa as well as in the New World, but the African form, as in Avicennia, differs somewhat from the American form and is now known as R. racemosa G. F. W. Mey. On page 487 of the same work Chapman notes that "In most plants one would refer to the seed, but in Avicennia there is no resting period, and growth of the embryo proceeds steadily. Although still surrounded by the testa the young fruit is quite capable of an independent existence long before it falls from the parent tree. For this reason I have preferred to call it a seedling rather than a seed. It might also be termed an embryo."

Ridley, in his Dispersal Pl. 310 & 499 (1930), says that "The A. tomentosa of New Guinea is very near this", but to which of the six types of Avicennia known from New Guinea he and Chapman refer is not clear.

Schott confused the Mexican material of A. germinans with the related Old World family Myoporaceae, while Millspaugh thought that some specimens [notably Gaumer 635 and Schott 473] represented the Old World A. officinalis L. [vid., Field Mus. Publ. Bot. 1: 316 (1896) and 386. 1898]. Millspaugh's opinion that two species were represented in the Yucatán material, Humboldt & Bonpland's proposal of three varieties, and Jacquin's proposal of two distinct species for the common North American, Mexican, Central, and South American species here regarded as A. germinans are all very understandable. If one examines only a relatively few isolated specimens from various widely scattered points in its tremendous range, as Humboldt & Bonpland seem to have done, or if one considers the very glabrous and shiny form as contrasted with the densely farinaceous-tomentellous form from isolated specimens of each, as Jacquin apparently did, it would be remarkable indeed if one did not reach the same conclusions that these distinguished workers reached. However, if one examines a very large series of specimens from Florida and Texas through both coasts of Mexico and Central America, from Bermuda and the Bahamas through the Greater and Lesser Antilles to Trinidad and the northern South American coastal islands, and from Colombia, Venezuela, and the Guianas to Brazil, Peru, Ecuador, and the Galapagos and other islands off the western coast of Central and South America, one finds that there is no constancy in these segregated "species" or "varieties". Every intergradation can be found; nor are the extremes of form correlated with extremes in geographic range, as Humboldt & Bonpland imply. Were this so, varietal designations might still be very convenient and justi-

fied in spite of intergrading forms. Actually, however, all the extremes of form can be found in one and the same region. Humboldt & Bonpland's "guayaquilensis" and "cumanensis" are to be found in Yucatán just as well as the "campechensis" form. Similarly, Jacquin's glabrous and tomentose forms may be found not only in the same locality, but on the same tree and even on the same twig! The Roots, in their 1923 work, state "The leaves....when they unfold are somewhat hairy, but later become bright green and shining above, paler or nearly white beneath."

Specimens which show all glabrous leaves include Jacquin's type of A. nitida at the British Museum and W. E. Broadway 5817 from Trinidad in the same herbarium (which, however, may represent A. schaueriana). Specimens which show both glabrous and pubescent leaves on the same twig include Fendler 1016 from Trinidad and Blanchet 328 from Brazil, both in the British Museum herbarium, while Luetzelburg 324a, from Brazil, exhibits, in addition, some leaves which are almost glabrous with scattered patches of furf. Gardner 1101, at the British Museum, shows the youngest leaves pubescent throughout on the under surface or only along the midrib, while the very large mature leaves are completely glabrous beneath.

Leechman 12, at Kew, has white-furfuraceous and glabrous leaves on the same twig and the two kinds are, in fact, adjacent pairs at the tip of the twig. It was collected on the seashore near Georgetown, British Guiana, in February, 1917. His no. 13 from the same locality and date shows only white-furfuraceous leaves. Both were identified as A. tomentosa by Leechman and annotated thus by Stapf. His no. 16, called "bush form" by him and found in strongly saline conditions of the Courida Swamp, Turkeyen, near Georgetown, exhibits both types of leaves on the same twigs, but has the blades more narrowly oblong. It was identified as A. nitida by both Leechman and Stapf. His no. 15, also referred to as the "bush form", but growing in fresh water conditions in the same swamp, is entirely white-furfuraceous. In both collections the petioles are extremely short and the leaf-blades narrowly oblong. His no. 14, identified as A. nitida by both Leechman and Stapf, has lanceolate blades and very long petioles, and is white-furfuraceous throughout. His no. 8 is said by Stapf to be the "nearest approach to Jacquin's Figure CXII.1 of Avicennia nitida (Sel. Stirp. Rar. Amer. Hist.)". On collection no. 14 the leaves (including their petioles) are 13--18 cm. long, while on no. 16 they are only 2--6.5 cm. long. No. 13 shows a pair of lower leaves sharply acute at the apex and precisely like A. marina var. acutissima Stapf & Moldenke in size, shape, and general appearance!

Sometimes there are two spikes in each axil or in some axils of a branch. Sometimes the spikes are so dense as to appear capitate on a long peduncle. Often the lowest pair of flowers is separated from the upper denser part of the spike by a short distance and is subtended by a pair of leaf-like, linear or oblong to spatulate, sessile bracts which are 4--17 mm. long.

A. germinans may be distinguished from A. schaueriana, with which it apparently grows in the southeastern portion of its range, by the following characters:

Corolla-lobes tomentose on both surfaces; leaf-blades mostly sharply acute at the apex; style elongated....A. germinans.

Corolla-lobes glabrous on the upper (inner) surface, tomentose outside; leaf-blades mostly rounded at the apex; style very short, the stigma subsessile.....A. schaueriana.

Perhaps it should be mentioned here, in passing, that it is not definitely established that Humboldt & Bonpland ever actually visited Campeche, as is implied by their variety "campechensis". A visit to this port is not recorded in any of the published accounts of their travels as far as I have been able to ascertain. However, in their "Flora Mexicana" [in H.B.K., Nov. Gen. & Sp. Pl. 7: 433-468. 1825] "Campeche" occurs at least 32 times as a locality for various species. Possibly someone sent them a collection of plants from this locality. The late Dr. John H. Barnhart, however, believed that they may have touched at Campeche very briefly either in early March, 1801, or sometime in 1804 while en route by ship to the more distant points as recorded in the accounts of their travels. Sprague, in his account of the localities in Mexico visited by Humboldt & Bonpland [Kew Bull. 1924: 24--27] has completely overlooked or deliberately ignored Campeche, probably indicating his belief that they did not ever visit there.

Edw. Palmer 484, Jurgensen 116, and Langlassé 146 -- all from Mexico -- have their inflorescences densely silky throughout, especially the bracts and rachis, but Ridley s.n., from Puerto Rico, is practically identical in this respect.

In all, 1834 herbarium specimens, including the types of all the names involved, and 19 photographs and mounted illustrations have been examined.

Millsaugh, in Field Columb. Mus. Publ. Bot. 2: 183 (1906) states that the species, in addition to the records cited below, was observed by M. A. Howe on New Providence, and by Britton & Millspaugh on Great Bahama, Great Harbor Cay, Frozen Cay, Ship Channel Cay, Great Guana Cay, and Exuma, in the Bahama Islands. On pages 191--245 (1907) he records it from the Marquesas Keys named A, B, C, D, E, F, G, H, and I.

Citations: FLORIDA: Brevard Co.: C. Atwood s.n. [January 10, 1917] (It); J. A. Harris C.19996 (H--4328); O'Neill 7117 (I), 7118 (I), s.n. [Cocoa, July 9, 1929] (W--1488524); Rhoads s.n. [Cocoa, 19 Oct. 1936] (Fl--12897, Fl--12898), s.n. [Cocoa, 22 Oct. 1936] (Fl--12896), s.n. [New Found Harbor, June 27, 1937] (H--50548); Rhoades & West s.n. [along Banana River] (Fl--21150). Broward Co.: Black 49-4362 (Be--45029). Collier Co.: A. S. Hitchcock s.n. [Marco] (F--232148). Dade Co.: J. G. Cooper s.n. [Cape Fla.] (C); W. Cooper s.n. [Cape Florida] (Br); H. C. Cowles S.27-1 (Cb--58183), s.n. [Miami, '06] (Ur); A. P. Garber s.n. [Miami, June '77] (F--311807, Pa, Vt); A. S. Hitchcock 1493

(F--233567), 1494 (F--233568); R. E. Matthews 17679 (Kr); B. Mc Allister 330 (H--41468); E. J. Palmer 27497 (E--931157); C. Skottsberg s.n. [16/5/1935] (Go); Small & Carter 806 (N), s.n. [Oct. 28th to Nov. 28th, 1903] (F--172377), s.n. [Shore, Miami] (W--962598); Spalding s.n. [Miami, Feb. 26, 1902] (Mi), s.n. [Miami, March 1902] (Mi); H. J. Webber 277 (F--228487). Flagler Co.: P. O. Schallert 20760 (Ur). Hillsborough Co.: Collector undesignated s.n. (Pr); Herb. Hooker s.n. [Tampa Bay] (K); Leavenworth s.n. [Tampa Bay, 1839] (C); Rolfs 248 (E--118568, F--228441, Fl--21152). Indian River Co.: Curtiss 1972 [fls. July & fr. Sept.] (B, Bm, Cm, E--874197, F--148252, Gg--163146, I, K, Mi, Mu--1661, Pa, Up--17069, Up--17070, Vt, Vu, W--59348, X), s.n. [Indian River] (N). Lee Co.: A. A. Eaton 1102 (F--166972, K, Oa); A. S. Hitchcock 270 (E--118569, F--101339, It, N, W--387304), s.n. [Myers, July-Aug. 1900] (Ka--62258), s.n. [Punta Rassa] (F--232278); O'Neill s.n. [Pepper Hammock] (Fl--21149); P. C. Standley 12790 (W--896251), 18995 (W--1028773), 57718 (F--918747); H. J. Webber 195 (F--228443); Wilbur & Webster 2525 (N). Levy Co.: A. W. Chapman 47 (W--59349); Godfrey & Redfearn 52828 (N); G. S. Miller 338 (W--1287725). Manatee Co.: Cuthbert 1356 (Fl--21147, Fl--21148), s.n. [June 23, 1916] (Fl--21146); Nash 2450 (B, Cb, Cl, E--118570, Ed, Es, F--48602, K, Mi, Mn--15354, N, P, Vu, W--252003); Rothrock 125 (Up--38261); J. H. Simpson 80 (Ca--220823, F--231176, W--334985); Tracy 6532 (N), 6772 (N). Martin Co.: C. Atwood s.n. [January 10, 1917] (Ob--200558). Monroe Co.: Bailey & Bailey 6107 (Ba); G. L. Bates 106 (Ob--50620); E. Scull s.n. [White Water Bay] (Fl--27572). Pinellas Co.: McFarlin 3688 (Mi); O'Neill 7115 (I); B. H. Patterson s.n. [St. Petersburg, Jan. 1918] (Cm). Sarasota Co.: Lochler s.n. [Sarasota Bay, 1884] (W--771901); B. H. Patterson s.n. [Jan. 20, 1918] (Cm); Weed s.n. [Englewood, April 23, 1939] (F--1019774). Volusia Co.: Haynie s.n. [4 July 1950] (Ur); H. N. Moldenke 21515 (Hk, Z); Spalding s.n. [New Smyrna, March 1902] (Mi); H. J. Webber 483 (E--118575). County undetermined: Bultman s.n. [Ocean Beach, Aug. 24, 1916] (Ar--1808); Cabanis s.n. [la. 26, east Fla.] (B, B, B); A. W. Chapman s.n. [south Florida] (C), s.n. (P); M. C. Reynolds s.n. [July--Oct. 1874] (Vt); Rugel 239 (E--118571, W--512163), s.n. (E--118572); J. H. Simpson 25 (W--59345), s.n. [Fla. 1890] (Du--90929, F--231367, W--59346). Anastasia Island: J. D. Smith s.n. [March 10, '79] (W--1323384). Ballast Key: Lansing 2306 (F--156770). Big Pine Key: Killip 32021 (N); O'Neill 7116 (I). Biscayne Key: H. J. Webber 273 (E--118574). Boca Chica Key: Bowman s.n. [Boca Chica, June 18, 1915] (Up--65333). Boca Grande Key: Lansing 2286 (F--156749). Cedar Keys: A. W. Chapman 47 (W); A. P. Garber s.n. [Cedar Keys, April 1876] (C, F--139479, Pa, W--265078), s.n. [Cedar Keys, Oct. 1877] (Pa, Vt); F. Walker s.n. [Cedar Keys] (I).

Elliott's Key: Small & Nash s.n. [Elliott's Key, Nov. 6 & 7. 1901] (Ar--7508, N). Key C: Lansing 2370 (B, F--156835). Key Largo: A. S. Hitchcock s.n. [Planters, June--July 1898] (F--231524), s.n. [Planters, April 1903] (F--231428); H. N. Moldenke 5819 (N, N); E. Scull s.n. [Key Largo, 8/25/37] (Bt--45936); Wolfe s.n. [Key Largo] (Fl--11783). Key West: Blodgett s.n. [Key West] (T); A. P. Garber s.n. [Key West, Aug. 1877] (Pa, Vt); A. S. Hitchcock s.n. [Key West, March 28--30, 1906] (F--230279); Lansing 2010 (F--156469); Edw. Palmer 403 (F--24878, Pr, W--59344), 6461 (E--116195); C. Skottsberg s.n. [Key West, 17/5/1935] (Go). Little Pine Island: H. N. Moldenke 929 (B, E--1002090, Go, H--5416, K, K, N, S, Up, W--1581794). Long Bush Key: Tandy 1261 (Bm). Long Key: Harshberger s.n. [Long Key, Dec. 29, 1910] (N, Up--63083); F. L. Lewton s.n. [Long Key, Aug. 6, 1894] (N). Man Key: Lansing 2335 (F--156799). Marquesas Keys: Lansing 2101 (F--156561, N), 2165 (F--156627), 2191 (F--156653), 2217 (F--156681), 2235 (F--156699, N), 2242 (F--156706), 2256 (F--156720), 2429 (F--156894, N). Merritt's Island: Mulvania s.n. [Merritt Island, July 12, 1930] (Hp); Rhoads s.n. [Merritt's Island, 28 June 1936] (Fl--12847). Newfoundharbor Key: W. R. Taylor 9365 (Up--75563), s.n. [Newfound Harbor Key, June 1, 1925] (Po--174964). Perico Island: Tracy 6772 (Bm, Cb, Ed, V). Sanibel Island: A. S. Hitchcock s.n. [Sanibel] (F--232079). Sarasota Keys: A. P. Garber s.n. [Keys Sarasota, May 1876] (Pa). Sugarloaf Key: F. W. Pennell 9574 (N). Thousand Islands: A. W. Chapman 46 (W--59347). Totten's Key: Small & Nash s.n. [Totten's Key] (N). Woman Key: Lansing 2410 (F--156875). MISSISSIPPI: Hancock Co.: Sanger s.n. [Bay St. Louis, Sept. 1916] (N). LOUISIANA: Jefferson Par.: L. E. Fox 2003 (Nc). Orleans Par.: Herb. Nuttall s.n. [New Orleans] (Bm); Nuttall s.n. [New Orleans] (K). Plaquemines Par.: Penfound s.n. [Nov. 26, 1938] (Tl). Terrebonne Par.: Lloyd & Tracy 249 (N). Caillou Island: Tharp s.n. [7-25-29] (Au), s.n. [Caillou Isl.] (Au). TEXAS: Cameron Co.: Clover 1251 (Ml, N); Muenschler & Winne 15577 (It); H. B. Parks 1724 (Au), s.n. [3-4-1940] (Tr--24067, Tr--24068, Tr--24072); R. Runyon 1420 (Rr, W--1567949), 2173 (Rr), 4031 (Au, S); Schott 139 (F--42568, T), II.139 (F--41304). Jefferson Co.: Tharp s.n. [7/29/39] (Au). Nueces Co.: Tharp s.n. [Port Aransas, 7/2/39] (Au, Au, Au, Gg--316189, Ml, N, N, N, Va). Brazos Santiago Island: R. Runyon 2077 (N), 2812 (N, N). Clark Island: Clover 715 (Au, Fs, Ml); Lundell & Lundell 8760 (Ml, N, N). Harbor Island: Whitehouse s.n. [April 16, 1933] (Au). MEXICO: Baja California: T. S. Brandegee s.n. [Magdalena Bay, Jan. 13, 1889] (Ca--104997, Du--205120), s.n. [January 1889] (Du--9532), s.n. [La Paz, Nov. 2, 1890] (Ca--104995); Collins, Kearney, & Kempton 137 (W--1530536); Diquet s.n. (N); Ferris 8680 (Du--214060, N, Po--210781,

W--1620715); H. S. Gentry 3689 (Ge); E. B. Higgins s.n. [Nov. 8, 1952] (Le); I. M. Johnston 3045 (Gg--31954), 4089 (Ca--251799, E--913191, Gg--31959, K, W--1316599), 4293 (Ca--251802, Gg--31955, K, S, W--1316681); H. L. Mason 1909 (Du--168457, F--716286, Gg--146788, K); Edw. Palmer 104 (W--59350); J. N. Rose 16718 (N, W--638747); Shreve 6516 (Me), 7099 (F--892876, Fs); Wiggins 5455 (Du--266005, Gg--292589, Gg--305140, It, N, Rs--30717, Se--82623, Ut--19669b). Campeche: Bonpland s.n. [Campeche] (N--photo, P, P, P, S--photo, Z--photo); Liebmann 11182 (W--1315033); Linden s.n. [Mai 1839] (S), s.n. [1840] (Cb), s.n. (P); Steere 1751 (Gg--208903, Mi). Chiapas: Matuda 2728 (Mh, Mi, N, N). Hidalgo: Collector undesignated s.n. [Regla] (Cp, Cp). Michoacán [or Guerrero]: Langlassé 146 (B, Cb, Cb, K, Me, Me, W--385751). Nayarit: Ferris 5396 (Du--150141, W--1492026); J. Gonzalez Ortega 5537 (Du--173327, K, Mu, W--1207567); Mexia 1008 (Ca--349978, Gg--154968, Gg--163701, Po--172716, W--1318663). Oaxaca: L. H. Bailey 608 (Ba); Elmore D.22 (N); Jurgensen 116 (Cb); Morton & Makrinus 2624 (Fs, K, W--1585614). Sinaloa: J. Gonzalez Ortega 4107 (N, W--1083842), 5181 (W--1165277), 6458 (Gg--202807); Herb. Com. Catast. Est. Rec. Nat. Estado 1131 (W--1014158); Edw. Palmer 228 (Cp, Mi, S, W--398867); Rose, Standley, & Russell 13309 (N, W--636140), 14046 (E--895334, F--704298, W--636904). Sonora: T. S. Brandege s.n. [Guaymas, May 12, 1892] (Ca--104997); Coville 1668 (W--398091); Drouet & Richards 3542 (F--1014246); I. M. Johnston 3288 (Gg--31957, W--1316302); G. Lindsay 1154 (Du--259262); Mallery & Turnage s.n. [Sargento Point, May 2, 1937] (Du--253338, Fs); Maltby 185 (N, W--314930); Rose, Standley, & Russell 12578 (N, W--635392); Shreve 6120 (Fs); Wiggins 6341 (Du--216070). Tamaulipas: Fournier s.n. [Tampico, Juin 1838] (P); Maury 6469 (Me); Edw. Palmer 484 (Bm, Cb, Cb, E--777509, E--777510, F--436421, K, N, Up--73900, W--463399, W--463400, W--463401). Yucatán: G. F. Gaumer 619 (E--118580, F--36422, Us), 635, in part (B, Bm, Cp, E--118579, F--36438, G, Gg--159697, K, N, S, Us, V, W--268722, X); Gaumer & sons 2340 (Cb, E--804668, F--446837, G, N, Oa, S, Ur, W--842318); Lundell & Lundell 8140 (Mi, Mi, N); Reiche 978 (Mu, Mu), s.n. [Progreso, 1927] (Mu); Schott 361 (F--40714), 473 (F--40347, W--59351), s.n. [Sisal, Yuc.] (E--118581); Steere 3092 (E--1087225, Mi), s.n. (Me). State undetermined: Beechey s.n. (S); Galeotti 2686 [Pacific coast; Herb. Reichenbach f. 123583 & 156396] (Br, F--588476, P, V, V); J. Gregg 1123 (E--118582); Herb. Hooker s.n. [Puebla Viejo, Zienaga, Julio] (K); Pavon s.n. [N. E.] (Bm); Sessé, Mocino, Castillo, & Maldonado 2188 (F--847126, N--photo, Q, Q, Z--photo). PICHILINQUE ISLAND: J. N. Rose 16516 (N, W--638565). CORONADOS ISLAND: I. M. Johnston 3758 (Ca--251800, Gg--31958, K, S, W--1316485). CARMEN ISLAND: I. M. Johnston 3821 (Ca--251801, Gg--31956, K, W--1316502); J. N. Rose 16636 (N, W--638673). MANGROVE ISLAND: J. N.

Rose 16309 (N, W--638370). TRES MARIAS ISLANDS: Maria Magdalena: H. L. Mason 1793 (F--600495, F--716304, Gg--149413, K, N); O. Solís 9 (Me). COZUMEL ISLAND: G. F. Gaumer 146 (B, G, K), s.n. [Cozumel I.] (Pa); Goldman 653 (F--281308, W--397023). GUATEMALA: Escuintla: G. Salas 367 (W--1167793); J. D. Smith 2510 (B, G, K, N, W--59352, W--1323379); P. C. Standley 63975 (F--985269). Izaabal: P. C. Standley 72167 (F--987991, N). Retalhuleu: P. C. Standley 66563 (F--987479), 87592 (N). San José: Kellerman 4566 (W--399620); Maxon & Hay 3659 (W--473599). San Marcos: Steyermark 37803 (F--1060792). Province undetermined: Friedrichsthal 250 (V), 1186 [Lapante] (V), 1256 [Lapante] (V), 1856 [Lapante] (V), s.n. (K, X). BRITISH HONDURAS: Cook & Martin 15 (W--1084552); Gentle 64 (F--713636, M1, N, S), 4719 (N), s.n. [Lundell 4719] (I, M1); Hummel 105 (K); C. L. Lundell 4131 (La, M1, N), 7009 (Au, Au, Du--289876, I, Mh, M1, N, S); Peck 399 (B, G, N); Schipp 625 (B, Bm, Ca--426846, Cb, E--990119, F--712207, G, K, M1, N, S). BAY ISLANDS: Holbox: G. F. Gaumer 16026 (Sg), s.n. (K). EL SALVADOR: Ahuachapán: Padilla 332 (W--1168506). La Paz: Choussy 1593 (W--1168785). La Unión: P. C. Standley 20786 (W--1136613). Sonsonate: P. C. Standley 21889 (W--1137644). COSTA RICA: Alajuela: Brenes 3866 [204; 4] (F--851722, N); Hoffmann 294 (B, B, Bm), 295 (B). Guanacaste: Cook & Doyle 743 (W--474660); Ørsted 11181 (Cp); H. Pittier 2813 (Bm, Br, Br, Mu--3788, P, W--1323383). Puntarenas: Maxon & Harvey 7841 (W--1181541); Orozco 466 (F--1010885); H. Pittier 7109 [Herb. Inst. Physico-geogr. Nat. Costaric. 10060] (B, X), 7110 [Herb. Inst. Physico-geogr. Nat. Costaric. 10060] (B, X); Stork 4037 (F--698872); Tonduz s.n. [Herb. Inst. Physico-geogr. Nat. Costaric. 10060] (X, X), s.n. [Herb. Inst. Physico-geogr. Nat. Costaric. 10066] (V, X). Province undetermined: Liebmann 11182 [Laguna colorado] (Cp). CABELLO ISLAND: Brenes 15696 [228; 229] (F--857974, N, N). PANAMA: Bocas del Toro: Cooper & Slater 81 (W--1317502). Canal Zone: P. H. Allen 1724 (N, N); Hayes 643 (T); H. Pittier 4969 (Cp); P. C. Standley 30889 (W--1219575). Coclé: H. Pittier 4969, in part (W--715143). Colón: Cowell 97 (N); Lay & Collie s.n. [San Blas] (Bm); H. Pittier 4116 (N, W--679213). Panamá: N. J. Anderson s.n. [Panama] (S). Province undetermined: Billberg s.n. (S); Duchassaing s.n. [1851] (P); Hayes s.n. [June, 1861] (Bm); Seemann s.n. (Bm). TABOGA ISLAND: H. Pittier 3614 (W--678672). PEARL ISLANDS: San José: C. O. Erlanson 120 (N). BERMUDA ISLANDS: Main: Brown & Britton 103 (F--203721, K, N, Up--45678, W--524818); Collector undesignated s.n. [1842] (Ed, Ed); F. S. Collins 257 (B, F--464804, K, N, P, V, W--717553); Degener 1294 (Gg--318668), 17853 (N), s.n. [July 7, 1921] (It), s.n. [Hungry Bay, July 20, 1921] (Ms); Degener & McCallan s.n. [Hungry Bay, July 7, 1921] (Ba);

Flym s.n. [Mar. 22, 1910] (N); Harshberger s.n. [6/12/05] (Up—39495, W—847492); Herb. Rein s.n. [1861—1863] (B); Lefroy 120 (K); A. H. Moore 2937 (F—190012, M1); Moseley s.n. [Challenger Exped.] (Bm, Bm, Ed, Ed, K, P); Rankin s.n. [June 23, 1897] (Pr); Setchell & Setchell s.n. [St. George's, June 8, 1921] (Ca—213489).

BAHAMA ISLANDS: Abaco: Brace 1849 (E—118583, F—183870, W—849122). Andros: Northrop & Northrop 593 (B, C, F—130682, K, X); Small & Carter 8771 (F—283770, K, N, W—758148). Crooked Island: Brace 4731 (F—199820, N). Easter Key: Howard & Howard 10205 (N, N). Fortune Island: A. S. Hitchcock s.n. [Fortune, XI.1890] (F—175459), s.n. [Fortune Is.] (E—47479). Inagua: Nash & Taylor 1326 (N). Mariguana: P. Wilson 7452 (F—221567, K, N). New Providence: C. F. Millspaugh 2482 (B, F—173173). Salt Key: P. Wilson 8101 (F—246498, K, N). South Bimini: C. F. Millspaugh 2396 (F—156365).

TURKS & CAICOS ISLANDS: Grand Turk: Nash & Taylor 3823 (N). CUBA: Camagtey: Shafer 1124 (B, N, W—659550), 2545 (Bm, F—251062, F—286063, N, P, W—697266, W—848764), 2630 (Bm, F—251139, N, P). Havana: Acuffa & Pujals 18966 (Es); Baker & Wilson 2310 (B, Po—63524), 2366 (B, Cp, Po—63522); Boldo 54 (Q); De la Ossa s.n. [1825] (Dc, Dc); Delessert s.n. (Cb); Ekman 456 (S); A. S. Hitchcock s.n. [Batabano, March 1906] (F—229655); León 2521 (Ha, N), 16108 (N, N, N), s.n. (Vi—1197); Marie-Victorin 58159 (Vi—25997, Vi—25998); Morales & Bosque 323 (B); Pavon s.n. (X, X); Ponce y Ramos s.n. [Herb. Roig 300] (Es); Rutten & Rutten-Pekelharing 7 (Ut); Shafer 116 (Cm, Es, Es); Van Hermann 909 (Bm, F—183651, K, N, P). Las Villas: Combs 80 (B, E—118586, F—16735, F—357901, Io—1039, K, Ka—61094, N); R. A. Howard 4940 (N, N, Um—48519, Ur—71289a), 5469 (N); J. G. Jack 4502 (B, K, P), 5008 (K, P), 5254 (P), 5683 (Ha), 7725 (B, Ba, M1, S); Luna 987 (Ha); Singleton 405 (Oa). Matanzas: Britton, Britton, & Shafer 228 (Cm); Fortún & Mural s.n. [Herb. Roig 3376] (Es—8578, Es); Rutten & Rutten-Pekelharing 219 (Ut). Oriente: Clément 2915 (Ha, N); Earle 89 (N); Eggers 4773 (B, K); Ekman 7982 (N, S); S. H. Hamilton 40 (N); C. F. Millspaugh 1009 (F—61009), 1019 (F—61019); Underwood & Earle 1657 (N). Pinar del Río: Roig 1102 (Es), 1681 (Es), s.n. (Es—6351); Roig & Chrysler s.n. (Es—8616); Rutten & Rutten-Pekelharing 564 (Ut—60494a); Vásquez s.n. [Herb. Roig 3689] (Es), s.n. (Es—8800). Province undetermined: Guio 59 (Q); Herb. Jamain s.n. (V, V); Sagra 212 (K), s.n. (B, P, V); C. Wright 3182 [1860—1864] (Bm, E—118585, Os, P, X). ISLA DE PINOS: Curtiss 312 (B, Bm, Cb, Cm, E—118584, Es, F—165223, It, K, Le, Mu—3992, N, P, Vt, W—521930); Jennings 115 (Bm, Cm, It, N, W—1045875), 254 (Cm, N), 693 (Cm, It, N, W—1045927); Marie-Victorin & Alain 210 (Vi, Vi). CAYMAN ISLANDS: Grand Cayman: Kings G.C.255 (N), G.C.270 (N). Little Cayman: Kings L.C.28 (N). JAMAICA: Arnott

s.n. (K); P. Browne s.n. [Herb. Linnaeus G.813, S.2] (Ls, N--photo, Z--photo); Campbell 5848 (B); Dancer s.n. (K); B. M. Davis s.n. [Clarendon, April 1926] (M1); Distin s.n. (K); W. Harris 5751 (B, F--145515), 8190 (B, Bm, F--146517), 9222 (B, Bm, F--212238, N, W--524661), s.n. [11.8.1901] (O1); Harris & Lawrence C.156 (Ur), C.1516 (W--794135), C.1518 (Ur); A. S. Hitchcock s.n. [Port Morant, 12-24-91] (E--118587), s.n. (F--228167); W. Hooker s.n. (P, P); Kidder s.n. [6 Mch. '85] (Oa--10754); Killip 89 (W--1045041); Lambert s.n. (Us); March s.n. [1858] (K), s.n. (N); Maxon & Killip 327 (F--500577, P, Ur, W--1046171); McDonnell 3026 (Bm); McFadyen s.n. (Le); Norman 159 (Bm); Parnell s.n. (Ed, Ed); Pessin s.n. [6/12/1919] (T1); Shakespeare s.n. (Bm); Shreve s.n. [Port Henderson, Jan. 4, 1906] (Fs); Stearn 52 (S), 178 (Bm), 325 (Bm, S), 816 (Bm); Swartz s.n. [Jamaica] (S, S); Wiles s.n. (K); N. Wilson s.n. (Cl); W. Wright s.n. (Bm); Yuncker 17136 (S), 17290 (S), 18159 (S). PIGEON ISLAND: G. R. Proctor 11493 (Bm). GREEN ISLAND: Stearn 287 (Bm). HISPANIOLA: Dominican Republic: W. L. Abbott 2735 (W--1145603); Eggers 2726 (B, C, Vu, W--1323375); C. A. Ehrenberg 376 (B); Ekman H.14750 (B, N, S); Fuertes 308 (B, Cb, Cb, Cb, Cb, Ed, Ed, N, P, P, Ut, V, W--658300), 1110 (B, Cb, Cb, Ed, Ed, N, P, Ut, V, W--698153); Jacquemont s.n. [St. Dominique, 1827] (K), s.n. [St. Dominique] (P, P, P); Paul, Duke of Württemberg s.n. [St. Domingo, 1830] (Mu--1691, Mu--1692); Rittré s.n. [1823] (V); Scarff s.n. (V--35405); N. Taylor 91 (N). Haïti: Buch 583 (B); Collector undesignated s.n. (B, P, T); Ekman H.8054 (B, Ca--608043, F--839480, M1, S, W--1412889); Eyerdam 188 (Se--20903, W--1303281), 20903-2 (Se--32034); Holdridge 1064 (N); Jäger 87 (B, Br, C, Cl, Cl, Le, P, S, V, Vu, W--249137), s.n. (Bm, Cp, W--597762); E. C. Leonard 2757 (Bm, F--505848, W--1075001), 5091 (F--505938, W--1077673); Leonard & Leonard 11635 (W--1450552), 15307 (W--1453578); G. S. Miller 281 (W--1148185); Nash 292 (F--158753, N); Picarda 319 (B), 1399 (B); Poiteau s.n. [1802] (Cb), s.n. (P); Prax s.n. [1854] (B); L. C. Richard s.n. (P, P); W. Schumann 330 (B). BEATA: R. A. Howard 12412 (N). GONAVE ISLAND: E. C. Leonard 3124 (B, W--1075381), 3311 (N, W--1075606); Prax s.n. [Mai 1854] (P, P, P), s.n. [1855] (P, P). PUERTO RICO: L. H. Bailey 69 (Ba); Barrus 89 (It); Bertero 108 (B); H. T. Cowles 2535 (Ms); E. E. Dale s.n. [May 23, 1926] (M1, M1); Goll 1063 (W--409590--photo), s.n. [Cataño] (W--429930--photo); Heller & Heller 373 (B, Bz--17108, F--119655, It, K, Lu, N, Us, W--425833); Johansen s.n. [Dec. 1916] (Oa); J. R. Johnston 839 (W--759066); Krug 901 (B); Laubengayer s.n. [March 2, 1929] (It); Otero 675 (Bt--52548); Ridley s.n. (Cb); Schwanecke 66 (B), 76 (B); Sintenis 723 (B, Cb, K, Lu, Mu--1662, S, W--1323376, X), 723b (B, Bm, N, W--1323374), 4893 (B, Bg, Bm, Cb, K, Le, Lu, V,

W-403368); Stahl 810 (B); J. A. Stevenson 426 (W-1475382).
 RATONES ISLAND: C. F. Millspaugh 657 (F-60657). VIEQUES: Shafer 2783 (F-415042, Gg-31960, N, W-790627), 3015 (N, W-790412).
 CULEBRAS: C. F. Millspaugh 582 (B, F-60582, N), 582 bis (F-60582). VIRGIN ISLANDS: St. Croix: Berg s.n. [Ins. St. Cruc.] (Lu); Børgesen s.n. [20.1.1906] (Bg); Collector undesignated s.n. (Cp, Ol); Herb. Hornemann s.n. (Cp); Herb. Hort. Bot. Haun. s.n. [St. Croix] (Bz-17107); Herb. Mus. Bot. Lund. s.n. [Ins. St. Crucis] (Lu); Ravn s.n. (S); A. E. Ricksecker 287 (B, Ca-473017, Du-210264, E-118588, F-70648, Le, N, Ob-114851, W-278173); L. A. Ricksecker 263 (B, E-118589, Ed, Ed, F-87893). St. Thomas: Børgesen s.n. [1/1896] (Mu-3731); Collector undesignated 159 (Q); Eggers 203 (Pa), 207 (B, B, Br, Ca-453446, Cb, Cb, Gg-31953, K, Le, Mu-1713, P, V, Vu, X), 670 (P); C. A. Ehrenberg 255 (B); Herb. Bonpland s.n. (B); Herb. Ventenat s.n. (Cb, Cb); Holton 515 (Cl, K, T); Kuntze 180 (N); Ledru 187 (P), s.n. [St. Thomas] (Ed, Ed); C. F. Morrow 90 (W-1146730); Riédlé s.n. (P, P); Schomburgk s.n. [St. Thomas] (N); West s.n. (Dc); Wydler 14 (B, Cb, Cb, Dc), s.n. (Le, V). Tortola: Fishlock 218 (K, N). LEEWARD ISLANDS: Antigua: Box 1356 (N); J. W. Gregory s.n. (Bm); Wullschlägel 438 (Mu-1085, V). Five Islands: Box 1356 (Bm). Guadeloupe: Bertero s.n. (Dc); Duchassaing s.n. (V); Duss 2942 (B, E-202762, N), 4132 (B); Forsström s.n. [Guadeloupe] (S); Grisebach s.n. [Guadeloupe] (E-118590); Imray s.n. (K); L'Herminier s.n. [1822] (Dc), s.n. [Guadeloupe] (X, X, X); Perrottet s.n. [16 Juin 1824] (Dc), s.n. [25 Juin 1824] (Cb, Cb); Quentin 160 [Duss 470] (P, P); L. Rodriguez 2930 (P, P); Stehlé 148 (N), 212 (S). Montserrat: Shafer 423 (Cm, F-294067, N, W-695376). St. Bartholomew: Euphrasén s.n. (Th); Forsström s.n. [St. Bartholomew] (S, S); Goës s.n. (B, S); Herb. Mus. Bot. Lund. s.n. [St. Barth.] (Lu), s.n. [Barthelem.] (Lu), s.n. [B.] (Lu). St. Kitts: Britton & Cowell 248 (B, K, N, W-419920). St. Martin: Boldingh 2498b [1627] (Ut), 2911b [2011] (Ut), 3026b [2074] (Ut); Suringar s.n. [3.V.1885] (B, Le, Le). WINDWARD ISLANDS: Bequia: Joseph B.65 (Bm, Ed, Ed). Grenada: W. E. Broadway s.n. [Woburn, March 17, 1905] (F-175982, N, W-848973), s.n. [March 19, 1905] (Cb). Martinique: Bélanger 739 (P); Duss 1224 (B, W-849678); Egler 39-34 (N, N); Hahn 348 (Cb, Cb, K), 654 (X), 759 (B, Bm, Br, Cb, Cb, P, W-59353), s.n. [1871] (Cb), s.n. [Martini-que] (X); Plée s.n. (B, P); Sieber s.n. (V), Fl. Mart. 318 (B, B, Br, E-118591, K, Le, Mu-1074, Mu-1075, P, V, V, V, X); Terras-son 13 (P). St. Lucia: Anderson s.n. (K). St. Vincent: Caley s.n. (Cb); Guiding s.n. [1822] (K), s.n. (Br, K); Smith & Smith 546 (B, C). TOBAGO: W. E. Broadway 3786 (Le, Le, Le, Ut), 3878 (B); Eggers 5897 (B, C). TRINIDAD: L. H. Bailey 654 (Ba); Bailey & Bailey s.n. [Feb. 17, 1921] (Ba); R. E. D. Baker s.n. [Trin. Bot.

Gard. Herb. 14313] (R), s.n. [Trin. Bot. Gard. Herb. 14314] (R); Boccus s.n. [Trin. Bot. Gard. Herb. 12609] (N, R); N. L. Britton 2595, in part (N, R, W--1194444); Britton & Broadway s.n. [March 19, 1921] (R); E. W. Broadway 2562 (B, Cp, Ed, Ed, Ed, Ed, F--249004, Le, Le, Mi, Mu--4306, W--655639), 3199 (B, Cb, Cb), 5815 (S), 5817 (Bm, Bm, K, K), s.n. [Trin. Bot. Gard. Herb. 3505] (B, R), s.n. [Trin. Bot. Gard. Herb. 5535] (R), s.n. [Trin. Bot. Gard. Herb. 7340] (R), s.n. [Trin. Bot. Gard. Herb. 7837] (R); R. L. Brooks s.n. [Trin. Bot. Gard. Herb. 12655] (N, R); Crüger s.n. [July 16, 1861] (R); H. M. Curran 3 (F--452575, N, W--920310); Curran & Haman 1343 (N, P); Fendler 1016 (Bm, Ed, Ed, Ed, K, Ph); Forest Ranger s.n. [Trin. Bot. Gard. Herb. 11594] (R); W. G. Freeman s.n. [Trin. Bot. Gard. Herb. 9374] (R); Kuntze s.n. [IV. 74] (N); Lockhart s.n. (K); R. C. Marshall 11594 (K), s.n. [Trin. Bot. Gard. Herb. 12650] (N, R); Othmer s.n. (Mu--4054); Riédlé 28 (P); Rutten-Pekelharig 320 (Ut); Swabey s.n. [Trin. Bot. Gard. Herb. 12560] (K, R), s.n. [Trin. Bot. Gard. Herb. 12879] (R), s. n. [Trin. Bot. Gard. Herb. 12906] (R); Trin. Bot. Gard. Herb. 2394 (R, W--1323373), 2401 (R), 3585 (W--1323386), 4590 (R), 5405 (B, R); E. Wall 67 (Go), s.n. [Asphalt Lake, 2/21/27] (Ew, Ew); Warming 202 (Cp, W--1324757); R. O. Williams s.n. [Trin. Bot. Gard. Herb. 11225] (R). BONAIRE: Boldingh 7462 (Ut), 7500 (Ut); Stoffers 925 (Ut--50764b), 937 (Ut--50760b). LOS ROQUES: Arraiz 1 (Ve), 2 (Ve). CURACAO: Arnoldo 2020 (Ut--18701b); Curran & Haman 84 (B, Bm, Ca--256151, K, P, S, W--1043960); Rose & Rose 22024 (W--763436); Suringar s.n. [12.I.1885] (B, Le), s.n. (Le). TORTUGA: Badillo 1222 (Ve--12628). MARGARITA ISLAND: J. R. Johnston 139 (B, Ca--146724, Cp, F--174529, K, Mu--4334, N, V, Vu, W--531968, W--962599, X). SAN ANDRES ISLAND: J. H. Hart 148 (W--1323385). WEST INDIES: Island undesignated: Collector undesignated s.n. (Ed, Ed, P); Eggers 102 (Mi); Euphrasén s.n. (S); Forsström s.n. [India occidentali] (Bm, S, S); Herb. Adanson s.n. (P, P); Herb. N. H. Bang s.n. (Cp); Herb. Gasström s.n. (S); Herb. Mus. Bot. Lund. s.n. [ex Antilles] (Lu); Ponthieu s.n. [Insulae Caribaeae] (Bm, Cb, S); L. C. Richard s.n. (Cb, Cb); Riédlé 647 (P, P); Sieber s.n. [Indes occidentales] (Cp, X), s.n. (Ol); Smeathman s.n. [India occidentalis] (Bm); Swartz s.n. (S, S); Von Rohr s.n. (Cp). COLOMBIA: Antioquia: Haught 4855 (N); Wawra 20 (V). Atlántico: Elias 455 (S, W--1344952), 1156 (F--709840, N), 1494 (F--881180); Killip & Smith 21076 (F--638432, N, W--1356017). Bolívar: Billberg 51 (S, S), s.n. [Carthagenae, Nov.--Dec. 1825] (S), s.n. [Carthagenae] (B); Collector undesignated 51 (Lu); Cufodontis 35 (V); Dahl s.n. [Carthagenae] (S); G. Debeaux 73, in part (P), s.n. [Cartagenae, 16 Avril 1877] (F--537911); Goudot s.n. [Cartagenae] (X); M. L. Grant 10705 (W--2059689); F. W. Pennell

12005 (N); E. Wall 120 (Ew). Cauca: F. C. Lehmann B.T.691 (K, Le, N, V). Chocó: Killip & Cuatrecasas 39160 (W--1856215). Magdalena: Barclay 3144 (Bm); G. Debeaux 73, in part (V); Karsten s.n. [Sabana] (V), s.n. (V); Schultze 383 (B); H. H. Smith 420 (B, Bm, Br, Cb, Cb, Cl, Cm, E--118596, Ed, Ed, F--137478, K, Le, N, P, S, Ut, Vt, W--532954), 1937 (B, B, Bm, Br, Ca--584799, Cb, Cb, Cl, Cm, E--118595, Ed, Ed, F--138763, K, Le, N, P, S, Ut, Vt, W--533775). Nariño: Dryander 2613 (N, N, W--1838212); R. Espinosa 2959 (N). Valle del Cauca: Killip & Cuatrecasas 38660 (N). Department undetermined: Dugand G.243 [80; La Plata; Yale Herb. 22532] (F--685464), 620 (F--727345); Goudot s.n. [1844] (P, P); Stübel 49 [La Boca] (B). VENEZUELA: Anzoategui: Tamayo 2070 (Ve--12632). Aragua: Ll. Williams 10423 (F--948397, F--986671, Ve--12635). Carabobo: Curran & Haman 1134 (Ca--254414, K, N, W--101113, W--1043439). Delta Amacuro: Curran & Haman 1275 (N), 1275a (B, F--559672, N, W--1043156), 1321 (E--909196). Falcón: Curran & Haman 550 (W--1010898); Tamayo 893 (Ve--12629, Ve--12634, W--1778297). Miranda: Badillo 434 (Ve--12631); H. Pittier 11011 (Cb, N, P, P, Ve--12636, W--1187527). Sucre: Bonpland 68 (B); W. E. Broadway 528 (N, W--1188039); Chaper s.n. [1885] (P); Humboldt 68 (B, N--photo, Z--photo); Steyermark 62900 (N). State undetermined: Curran & Haman 1242 (W--1011143); Mocquerys 829 (P, P, P); Otto 950 (B, B, B). BRITISH GUIANA: Archer 2625 (Ar--12015); W. H. Campbell 2 (Ed, Ed); Dahlgren & Persaud s.n. [Plu. Providence] (F--519858); De la Cruz 1090 (N, W--1069953), 3463 (Ca--300600, E--917780, F--544440, N); Fanshawe s.n. [Herb. Forest Dept. 6357] (Ut--13199b); S. G. Harrison 1534 (N), 1596 (N), 1673 (N), 1716 (N); Herb. Forestry Branch Dept. Lands & Mines 537 (K); A. S. Hitchcock 16565 (N, S, W--1055867); ImThurn s.n. (K); Jerman 4869 (C), 5468 (Bm, K, N), 5855 (K); Leechman 6 (K), 7 (K, N), 8 (K), 9 (K), 10 (K), 11 (K), 12 (K), 13 (K), 14 (K), 15 (K), 16 (K); Mell & Mell 248 (N, W--1481570); C. Parker s.n. [Demerara] (K); W. Parker 195 (Dc), s.n. [Demerari 1822] (Dc); Persaud 101 (F--532479), s.n. [Demerara, 1924] (F--550616, F--550617, F--550618); Rich. Schomburgk 845 (Bm, C, Cb, Cb, Cb, P, P, V, X), 845/1328 (K), 1328 (B), s.n. [1840--44] (Dr); Spruner s.n. [1846] (X, X); H. F. Talbot s.n. [1840] (K). SURINAM: Collector indig. Suriname 186 (Ut), s.n. (Ut); Collector undesignated 21 (Le), s.n. [pr. Paramaribo] (B), s.n. (Ut); Florschütz & Florschütz 1927 (N, Ut--80111b); Geijskes s.n. [13, VI.1948] (Ut--13661b); Herb. Bosbeheer Suriname 137 (Ut--6268b), 1048 (Ut--10570b), 1049 (Ut--10571b), 1095 (Ut--29405b), 1096 (Ut--29404b), 1097 (Ut--29406b), 1404 (Ut--14152b), V.63 (Ut--82776b); Hostmann 457 (B, Bm, Cb, K, K, P, Ut, V, V, X), 1140 (Bm, Cb, E--118594, K, Ut, V, V, X), s.n. (Le); Hostmann & Kappler 528 (S), 1140 (S); Kegel 1023 (Gt); Lanjouw 646 [photo 153] (N, Ut),

1099 (Ut); Lanjouw & Lindeman 301 (N, Ut—17661b), 1352 (N, Ut—17660b), 1517 (N, Ut—17658b), 1518 (N, Ut—17657b), 1520 (N, Ut—17656b), 1521 (N, Ut—17659b); C. D. Mell 21 (W—1140395); Mennega 195 (Ut—81330b); Miquel s.n. [ad ripas flumin. Surinam] (K); Moldenke & Moldenke 19586 (Es, F, Fy, Lg, Mg, Mr, N, No, Ot, S, Sm, Ss, Vi); Plukenet s.n. [21.D.] (Le, Le); Soeprato 19f (Ut), 33 (Ut), 45h (Ut), 352 (Ut); Splitgerber 77 (Le), s.n. [Dec. 1837] (V), s.n. (P); Stahel 107 (Ut—71895a), s.n. [Sept. 2, 1934] (N, N, N, N, N, N); Tulleken 289 (Le), 304 (Le), 535 (Le, Ut); Weigelt s.n. [1827] (B, B, Br, Cb, Dc, Le, X), s.n. (Cp, V, V, V, V, V, V); Woodherbarium Surinam 107 (Be—38349, N); Wullschlägel 412 (Br, V, V). FRENCH GUIANA: Benoist 22 (P, P, P); W. E. Broadway 691 (N, W—1068859); Collector undesignated 58 (Q), s.n. [Cayenne] (P, P), s.n. (Dc); Crévaux s.n. [Riviere de Kourou, Mars 1877] (P), s.n. (K); Degelius s.n. [Cayenne, 5/VI/1958] (S); Geay 1917 (P), 1935 (P), 1936 (P); Herb. Barbier s.n. [Guyane] (W—1123312); Leguillon s.n. [1857—59] (B); Leprieur s.n. [Guyane fr.] (P); Martin s.n. [Cayenne] (K); L. C. Richard s.n. [Cayenne] (P); Sagot 471 (Bm, K, P, P, P, P, P, P, V, V, X), s.n. [Mara, Avril 1854] (P); Soubirou s.n. (P, P, P). ECUADOR: Bolivar: R. Espinosa 2414 (N), 2450 (N). El Oro: A. S. Hitchcock 21104 (N, W—1196174); Hjerting & Rahn 653 (S). Esmeraldas: Harling 1696 (S); E. L. Little 6363 [Herb. U. S. Forest Serv. 98224] (It, N); Seemann 1106 (K). Guayas: N. J. Andersson s.n. [Guayaquil, 1852] (S); Asplund 15221 (S), 18188 (S); Bonpland s.n. [Guayaquil] (B, N—photo, P, P, P, P, Z—photo); Fagerlind & Wibom 87 (S), 114 (S); Gaudichaud 92 (B, Cb, Cb, Dc, P, P); Hall 13 (K); E. L. Little 6750 [U. S. Forest Serv. 98495] (N); Rimbach 54 [Yale Herb. 20747] (Ca—501845, Du—223846, F—690258), 56 (F—704880); Schimpff 379 (B, B, Cb, Cb, E—1088364, W—1619455); Spruce 6519 (Bm, Ed, Ed, K). Manabi: Asplund 16588 (S). Province undetermined: Mille 87 (N). PUNA ISLAND: N. J. Andersson 92 (S); Hinds s.n. [1841] (K). GALAPAGOS ISLANDS: Albemarle: A. Stewart 3266 (Gg—31947). Charles: Edmonston s.n. (K); A. Stewart 3267 (E—817127, Gg—31352, N, W—921580). Chatham: N. J. Andersson s.n. [Chatham, 1852] (Cb); Darwin s.n. [Chatham Isl.] (P); A. Stewart 3268 (Gg—31951). Duncan: A. Stewart 3269 (Gg—31949). Indefatigable: Chapin 1120 (N); J. B. Hicks 407 (Bm, K); Steindachner 50 (V), 51 (V); A. Stewart 3270 (E—817130, Gg—31943), 3271 (Gg—31945); T. W. J. Taylor T.T.91 (N). James: N. J. Andersson s.n. [Ins. James, 1852] (Br), s.n. [James Isl.] (S); L. E. Cheesman 385 (Bm, K); Snodgrass & Heller 368 (N, W—543105); A. Stewart 3272 (Gg—31946). Jervis: A. Stewart 3273 (Gg—31948). Santa Cruz: Rorud 205 (Ol); Schimpff 30 (B, Bm, Cb, E—1072247, N, P, S, Ut);

Von Hagen 8 (N, N, N), 80a (N), 80b (N), 80c (N); Wavrin s.n. (Br, Br). Seymour: A. Stewart 3274 (Gg-31944). South Seymour: Snodgrass & Heller 605 (Du-9533). Island undesignated: N. J. Andersson 120 (B, Cp, K, Lu, P, Us, Us, V), s.n. [Ins. Galapagos, 1852] (E-118609); Goodridge s.n. (Cl). PERU: Tumbes: Raimondi 2278 (B). Department undetermined: Pavon s.n. (Cb, P); Ruiz & Pavon 18/10 (F-845433). BRAZIL: Bahia: Blanchet 328 (Bm, Br, Cb, Cb, Cp, Cp, P, P), 1427 (Dc), s.n. [1832] (M); Collector undesignated s.n. (V); Luetzelburg 324a (Mu); Salzmann 431 (Dc-29), s.n. [1831] (Cb, Ed, Ed), s.n. [Bahia] (E-118593, K, K, P); Sellow s.n. [Vitoria et Bahia] (B). Ceará: Allemão s.n. (Ja-32258); Drouet 2442 (E-1110546, F-857471, F-949342, I, N, N, S, Sp-37514). Espirito Santo: Glaziou 4925 (B, Cp, Cp, P), 9988 (Cp, K, P), 11324 (B, Cp, K, P). Gofas: Brenning 952, in part (B). Maranhão: Brenning 952, in part (B); Ducke 402 (Bm, Cb), s.n. [Herb. Rio de Jan. 5405] (N); Fróes 1818 (B, Cb, E-1042064, K, N, P, S, Ut); Lisbôa s.n. [Herb. Rio de Jan. 4792] (B, Ut); Snethlage 241 (B). Pará: Black 48-3236 (N), 48-3237 (Be-37728, N), 48-3427 (Ut-74081b); Collector undesignated s.n. (P); Curran 16 (F-740465, S, W-1617777); Ducke 9818 [Herb. Rio de Jan. 5407] (N); Huber 1181 (X, X, X); Martius 2644 (Mu-1070), s.n. [Mart. 1820] (Mu-1072), s.n. [Aug.] (Mu-1071), s.n. [Sept.] (Mu-1069); Poeppig s.n. [Colares, Maio 1839] (V); N. T. da Silva 163 (Be-42567). Pernambuco: Curran 48 (F-740466, Mi, S); G. Gardner 1101 (Bm, Cb, Cb, Ed, Ed, K, K, N, P, P, S, V, V, V, V, W-1066491), s.n. [Pernambuco, 1837] (N); Sobrinho 287 (N, N, N). State undetermined: Boog s.n. (K); Freyreiss s.n. (S); Hornemann s.n. (Cp); Jobert 306 [Copacabana, bas Amazon] (P); Sellow 170 (B), 188 (B), 360 (B), s.n. [Brasilia] (B, K, S); Westin s.n. (N-photo, Th, Z-photo). MARAJÓ ISLAND: Black 48-3427 (Be-37915), 48-3487 (Be-37973). CULTIVATED: Guadeloupe: L. Rodriguez 3051 (P, P). LOCALITY OF COLLECTION UNDESIGNATED: Baudin s.n. (P); Boldo 55 [Cancy] (Q); Collector undesignated 87 (P), 177 [Herb. Linnaeus G.813, S.1] (Ls, N-photo, Z-photo), 370 (P), 1131 (Me), s.n. (C, Dc, P, V); Havn 779 (V); Herb. Coleman s.n. (S); Herb. Gasström s.n. (S); Herb. Jacquin s.n. (Bm, Bm); Herb. Link s.n. (B, B); Herb. Miller s.n. (Bm, Bm); Herb. Persoon s.n. (Le); Herb. Rottböll s.n. (Cp); Joor s.n. (E-118576, E-118577); Lambert s.n. [1816] (Dc); Née 56, in part (Q); Pflug s.n. [Am. mer.] (Cp, Cp); Pollart de Canidri s.n. (Br); Roxburgh s.n. (Ed); Schlechtendal 2143 (S); Von Rohr & Ryan s.n. (Cp, Cp). MOUNTED ILLUSTRATIONS: Krug, Icon. Pl. Portoric. pl. 99 (S); Lam., Tabl. Encycl. Méth. Bot. pl. 540 (Cb).

AVICENNIA LANATA Ridl., Journ. Fed. Mal. States Mus. 10: 151-152. 1920.

Synonymy: Avicennia officinalis var. spathulata Kuntze, Rev. Gen. Pl. 2: 502. 1891. Avicennia officinalis var. spathulata f. tomentosa Kuntze, Rev. Gen. Pl. 2: 502. 1891.

Literature: Kuntze, Rev. Gen. Pl. 2: 502. 1891; Ridl., Journ. Fed. Mal. States Mus. 10: 151--152. 1920; Hill, Ind. Kew. Suppl. 6: 23. 1926; J. G. Wats., Malayan Forest Rec. 6: 63 & 64. 1928; Hill, Ind. Kew. Suppl. 7: 23. 1929; Ridl., Dispersal Pl. 310. 1930; Moldenke, Geogr. Distrib. Avicenn. 33. 1939; Moldenke, Suppl. List Common Names 2, 9, & 24. 1940; Moldenke, Prelim. Alph. List Invalid Names 6. 1940; Moldenke, Alph. List Invalid Names 5. 1942; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 60, 61, 64, & 86. 1942; Moldenke, Phytologia 2: 92. 1944; Moldenke, Alph. List Cit. 1: 80 & 137 (1946), 2: 353 & 625 (1948), 3: 774 (1949), and 4: 1040, 1093, 1105, & 1110. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 138, 139, 145, & 174. 1949; Moldenke, Résumé 179, 236, & 440. 1959.

Large tree, to 26 m. tall; branchlets and twigs rather slender, very densely appressed-puberulent with sordid-grayish or brownish hairs, subterete or the youngest more or less tetragonal and sulcate in drying, not conspicuously lenticellate; nodes, especially on larger branchlets, swollen, conspicuously annulate and articulate; leaf-scars inconspicuous; principal internodes 1.5--8 cm. long; leaves decussate-opposite; petioles slender or rather stout, 5--16 mm. long, flattened above, longitudinally wrinkled beneath in drying, more or less densely pulverulent or pubescent like the twigs; leaf-blades firmly chartaceous, mostly thin-textured, bright- or dark-green and rather shiny above, flavescent or sordid-grayish beneath, elliptic or obovate, 6--9.7 cm. long, 3.3--5.5 cm. wide, rounded or bluntly subacute at the apex, entire, acute or acuminate at the base, obscurely pulverulent or glabrate and shiny above and not impressed-punctate, closely yellow-tomentellous or densely appressed-puberulent-puberulent with sordid or (usually) flavidous furf beneath, rarely less conspicuously so in age, the margins not revolute; midrib slender, prominulent above and usually canaliculate for one-half its length or longer, rounded-prominent beneath, not extending through to the apex; secondaries slender, 4--7 per side, ascending, arcuate toward the margins, joined in many rather irregular loops several mm. from the margins, prominulent on both surfaces, often hidden by the furf beneath; vein and veinlet reticulation rather abundant, subprominulent on both surfaces or hidden by the furf beneath; inflorescence axillary and terminal, mostly paniculate-branched with about 3 very short capitately 1--3-flowered branches or in corymbose heads, in all 2--6 cm. long and 1--3 cm. wide; peduncles tetragonal and sulcate in drying, varying from yellowish-tomentellous to densely appressed-puberulent or short-pubescent with sordid-flavidous or brownish hairs, 0.9--2.5 cm. long; foliaceous bracts often present, 1 pair subtending the inflorescence-branches, densely tomentellous; flowers very agreeably fragrant; calyx-lobes tomentose on the outer surface; corolla glabrous within, densely hairy on the outside, its lobes strongly decurved or recurved;

filaments about the same length as the anthers; anthers dorsifixed, elliptic; style bifid, very short, brown, its lobes erect; ovary light-green, glabrous, but surrounded at the base by dense tomentum; fruiting-calyx practically unchanged, brown, densely appressed-puberulent; fruit sessile, ovate or ovoid, to 1.4 cm. long and wide, not beaked, very densely tomentose-lanate with sordid-flavous or grayish hairs, apiculate.

The species is based on Watson & Burkill 3793, from the River Valley Road, Singapore, collected on August 9, 1918, Burkill 3797, from the same locality, collected on September 17, 1918, and J. G. Watson 2767 from Kuantan, Pahang, Malaya, deposited in the herbarium of the Royal Botanic Gardens at Kew. In the original publication the first two of these cotypes are cited as "Burkill & Watson 3793 and 3797". The Herb. Forest Dept. F. M. S. 2767, cited below, was misidentified by me in my Alph. List Cit. 2: 353 (1948) as A. nitida Jacq.

The type of A. officinalis var. spathulata and its f. tomentosa is Kuntze 6046, from Singapore, deposited in the Britton Herbarium at the New York Botanical Garden.

Common names recorded for A. lanata are "api-api bĕrbulu", "api-api puteh", "hairy api-api", and "white api-api". However, "api-api puteh" and "white api-api" are applied also to A. marina (Forsk.) Vierh. and to A. officinalis L. The species was erroneously recorded by me from British North Borneo in my Geogr. Distrib. Avicenn. 33 (1939) and Known Geogr. Distrib. Verbenac., [ed. 1], 64 (1942) and [ed. 2], 145 (1949). The Warburg 17522 from Amboina, originally annotated by me as A. lanata, is actually A. officinalis L., and the Loher 4450 from the Philippines is in part A. marina (Forsk.) Vierh. and in part A. marina var. rumphiana (H. Hallier) Bakh.

Ridley distinguishes his species from A. officinalis as follows: in A. officinalis the corolla-lobes [he says "calyx-lobes" by mistake] are patent but not recurved, the filaments are much longer than the anthers, the style is long and slender, and the flowers have an unpleasant smell; in A. lanata the corolla-lobes are recurved, the filaments are the same length as the anthers, the style is short, and the flowers are agreeably fragrant. Personally, I am not entirely convinced that the species are distinct. Mature flowers have not been available to me for examination. Without them it is impossible to tell if A. lanata is actually closely related to A. officinalis, as Ridley implies when he compares it only with that species, or whether it is not, rather, closely related to A. marina var. rumphiana. Tentatively, I have placed it in the Upata section of the key and in the small-flowered A. marina affinity. The few flowers that I have been able to measure did not appear to be very wide, but Ridley surely would have noticed flower-size when he compared his plant with the large-flowered A. officinalis, so I am allowing it to be reached in the key as both small-flowered and large-flowered.

Further study of fresh material is essential for the solution of this problem.

In all, 10 herbarium specimens, including the types of all the names involved, and 9 mounted photographs have been examined.

Citations: MALAYA: Malacca: Vesterdal 316 (Cp). Pahang: J. G. Watson 2767 [Herb. Forest Dept. F. M. S. 2767] (K--cotype, N--photo of cotype, Z--photo of cotype). Singapore: Burkill 3797 (K--cotype, N--photo of cotype, Z--photo of cotype); Curran s.n. [Singapore, Aug. 1910] (N--photo, W--902044, Z--photo); Kuntze 6046 (N); Nur s.n. [May 29, 1934] (F--752072, N); Watson & Burkill 3793 (K--cotype, Mi--photo of cotype, N--cotype, N--photo of cotype, Z--photo of cotype), 3795 (K).

AVICENNIA LANCEOLATA (Engelh.) Moldenke, comb. nov.

Synonymy: Jambosa lanceolata Engelh., Abh. Senck. Naturf. Gesell. 19: 35--36, pl. 9, fig. 6 & 7. 1895.

Literature: Engelh., Abh. Senck. Naturf. Gesell. 19: 35--36, fig. 6 & 7. 1895; Berry, Bull. Torrey Bot. Club 63: 65. 1936.

Illustrations: Engelh., Abh. Senck. Naturf. Gesell. 19: pl. 9, fig. 6 & 7. 1895.

Engelhardt's description and discussion are worth repeating here: "Das Blatt ist lederig, lanzettförmig, zugespitzt, ganzrandig; der Mittelnerv ist kräftig, die Seitennerven sind schwach, gehen unter spitzen Winken aus, verlaufen etwas bogig und verbinden sich vor dem Rande zu einem Saumnerven untereinander. Nur Bruchstücke liegen vor, welche weniger gut als die Exemplare der meisten übrigen Arten erhalten geblieben sind, weshalb die feinerer Nervatur nicht zu erblicken ist. Nur die für diese Blätter charakteristischen, durch die Mitte der Hauptfelder laufenden und vor ihrem Ende sich abwärts zu den unteren Seitennerven neigenden Nerven sind zu erblicken. Ich vergleiche die fossile Stücke mit kleineren Blättern der Jambosa vulgaris DC., bei welchen sich auf der Oberseite die Nervatur ebenfalls wenig ausgeprägt zeigt. Bei Avicennia tomentosa Jacq., an die man ebenfalls denken könnte, besitzen die Blätter eine viel ausgeprägtere Nervatur. Rührten unsere Stücke von dieser her, so wäre es unverständlich, wenn nicht einmal stückweise der feinere Geäder erhalten geblieben wäre."

The type of this species was collected by Friedrich Carl Lehmann at Santa Ana in the Cauca Valley, Colombia, in rocks of Tertiary age. Berry, in the reference cited above, says "What is almost certainly a second fossil occurrence of Avicennia may be seen in a form from the Tertiary of Colombia, which Engelhardt erroneously referred to the myrtaceous genus Jambosa Rumphius and compared with the Oriental Jambosa vulgaris De Candolle, extensively cultivated in tropical South America."

Personally, I see very few differences worth mentioning between the four so-called fossil species or between them and the present-day A. germinans. Certainly one could find leaves and fruit abundantly in the present-day A. germinans to match all

those illustrated for the fossil species. However, in deference to standard paleobotanic practice, I am retaining all of them as presumably valid taxa.

AVICENNIA MARINA (Forsk.) Vierh., Denkschr. Akad. Wissensch. Wien Math.-nat. 71: 435. 1907.

Synonymy: Sceura marina Forsk., Fl. Aegypt.-arab. 2: 37. 1775.

Rack Bruce, Trav. Abyss. & Nub. 5: app. 44. 1790. Racka torrida J.

F. Gmel., Syst. Nat. 2: 245. 1791. Halodendrum Thou., Gen. Nov.

Madag. 8. 1806. Halodendron Roem. & Schult., Syst. Veg. 3: 485.

1818. Halodendron thouarsi Roem. & Schult., Syst. Veg. 3: 485.

1818. Racka ovata Roem. & Schult., Syst. Veg. 3: 207. 1818.

Avicennia tomentosa L. ex Blume, Bijdr. Fl. Ned. Ind. 14: 821.

1826 [not A. tomentosa Blanco, 1845, nor Blume, 1918, nor Jacq.,

1760, nor L. & Jacq., 1783, nor R. Br., 1851, nor G. F. W. Mey.,

1818, nor Nutt., 1947, nor Nutt. & Br., 1832, nor Roxb., 1835,

nor Schau., 1940, nor Sieber, 1844, nor Sw., 1864, nor Willd.,

1800, nor Weigelt, 1851]. Avicennia tomentosa var. arabica Walp.,

Repert. 4: 133. 1845. Avicennia intermedia Griff., Trans. Linn.

Soc. Lond. Bot. 20: 6, pl. 1. 1846. Halodendron thouarsi Roem. &

Schult. ex Schau. in Mart., Fl. Bras. 9: 306, in syn. 1851. Avi-

cennia tomentosa Wall. ex Schau. in Mart., Fl. Bras. 9: 306, in

syn. 1851. Avicennia officinalis var. ovatifolia Kuntze, Rev.

Gen. Pl. 2: 502. 1891. Avicennia officinalis var. ovatifolia f.

flaviflora Kuntze, Rev. Gen. Pl. 3 (3): 249. 1898. Avicennia of-

ficinalis var. ovatifolia f. tomentosa Kuntze, Rev. Gen. Pl. 3

(3): 249. 1898. Avicennia mindanaense Elm., Leaf. Philipp. Bot.

8: 2868. 1915. Avicennia sphaerocarpa Stapf ex Ridl., Journ. Fed.

Malay States Mus. 10: 151. 1920; Fl. Malay Penins. 2: 642. 1923.

Avicennia tomentosa Vahl ex Bakh., Bull. Jard. Bot. Buitenz., sér.

3, 3: 204, in syn. 1921. Avicennia marina var. typica Bakh., Bull.

Jard. Bot. Buitenz., sér. 3, 3: 205. 1921. Racka torrida Bruce ex

Bakh., Bull. Jard. Bot. Buitenz., sér. 3, 3: 205, in syn. 1921.

Avicennia marina var. intermedia (Griff.) Bakh., Bull. Jard. Bot.

Buitenz., sér. 3, 3: 211. 1921. Avicennia mindanaensis Elm. ex

Prain, Ind. Kew. Suppl. 5: 27. 1921. Avicennia alba Wight ex

Bakh., Bull. Jard. Bot. Buitenz., sér. 3, 3: 211, in syn. 1921

[not A. alba Blume, 1826, nor Karst., 1907]. Avicennia officinalis

var. nigra Cowan, Rec. Bot. Surv. India 11: 203 & 220. 1928.

Avicennia officinalis Maxim. ex P'ei, Mem. Sci. Soc. China 1 (3):

186, in syn. 1932 [not A. officinalis L., 1753, nor H. J. Lam,

1940, nor Millsp., 1930, nor Schau., 1856]. Trichorhiza

lechenaultii Miq. ex Moldenke, Prelim. Alph. List Invalid Names

43, in syn. 1940. Avicennia marina var. marina (Forsk.) Bakh. ex

Moldenke, Résumé 235, in syn. 1959. Avicennia lanceolata Willd.,

in herb. [not A. lanceolata (Engelh.) Moldenke, 1960]. Avicennia

mariana Vierh., in herb. Avicennia racemosa Cornwell, in herb.

Avicennia nitida Thunb., in herb. [not *A. nitida* Jacq., 1760, nor Blanco, 1837, nor L., 1960, nor L. & Jacq., 1783, nor Rodsch., 1844, nor Sessé & Moc., 1894].

Literature: Forsk., Fl. Aegypt.-arab. 2: 37. 1775; Bruce, Trav. Abyss. & Nub. 5: app. 44--46. 1790; R. Br., Prodr. Fl. Nov. Holl., ed. 1, 1: 518. 1810; Lam., Encycl. Méth. Suppl. 1: 539. 1810; Roem. & Schult., Syst. Veg. 3: 34, 207, 485, & 519. 1818; Blume, Bijdr. Fl. Ned. Ind. 14: 821. 1826; Roxb., Fl. Ind., ed. 2 [Caryey], 3: 88. 1832; Wall., Pl. As. Rar. 3: 44, pl. 271. 1832; E. Mey., Comm. 277. 1837; Drège, Zwei Pflanzengeogr. Documente 159, no. 32. 1844; Walp., Repert. 4: 131. 1845; Hochst., Flora 28: 68. 1845; Griff., Trans. Linn. Soc. Lond. Bot. 20: 6 & 7, pl. 1, fig. 8 & 11. 1846; Griff., Ann. Sci. Nat. Bot., ser. 3, 7: 11 & 12, pl. 1, fig. 8 & 11. 1847; Schau. in A. DC., Prodr. 11: 699--700. 1847; Wight, Icon. Pl. Ind. Or. 4 (3): 12, pl. 1481. 1849; Schnitzlein, Iconogr. 2: pl. 137**. 1856; Harv. & Sond., Fl. Cap. 2: 513--514. 1862; C. B. Clarke in Hook. f., Fl. Brit. Ind. 4: 604. 1885; Watt, Dict. Econom. Prod. Ind. 1: 361. 1889; Kuntze, Rev. Gen. Pl. 2: 502. 1891; Jacks., Ind. Kew. 1: 254 & 1090 (1893) and 2: 679 & 822. 1895; Kuntze, Rev. Gen. Pl. 3 (3): 249. 1898; J. G. Baker in Thiselton-Dyer, Fl. Trop. Afr. 5: 331--332. 1900; J. Schmidt, Bot. Tidsskr. 26: 60--68 & 97, fig. 28--30 & 43 (8). 1904; J. Schmidt in Karst. & Schenck, Veget.-Bilder 3: pl. 38. 1906; Sim, For. Fl. Cape Col. 287, pl. 120, fig. 3. 1907; Vierh., Denkschr. Akad. Wissensch. Wien Math.-nat. 71: 435. 1907; Sim, For. Fl. & Res. Portug. E. Afr. 94--95, 119, 125, & 139, pl. 83. 1909; Engl. in Engl. & Drude, Veget. Erde 9 [Pflanzenwelt Afr. 1 (1)]: 2, 231, 233, & 1021, pl. 45, fig. 202. 1910; H. H. W. Pearson in Thiselton-Dyer, Fl. Cap. 5 (1): 225. 1910; Hayata, Acts Bot. Cong. Bruxelles 2: 68, pl. 12--14. 1912; Prain, Ind. Kew. Suppl. 4: 21. 1913; Bews, Journ. Ecol. 1: 75 (1913) and 2: pl. 22. 1914; Elm., Leafl. Philipp. Bot. 8: 2868. 1915; Kanehira, Formosan Trees 2, 15, 393, & 394. 1917; H. J. Lam, Verbenac. Malay. Arch. 341 & 361. 1919; Ridl., Journ. Fed. Malay States Mus. 10: 151. 1920; Engl. in Engl. & Drude, Veget. Erde 9 [Pflanzenwelt Afr. 3 (2)]: 661--679. 1921; Bakh., Bull. Jard. Bot. Buitenz, sér. 3, 3: 205 & 211, pl. 14--19. 1921; Prain, Ind. Kew. Suppl. 5: 27. 1921; Ridl., Fl. Malay Penins. 2: 642. 1923; Heyne, Nutt. Plant. Nederl. Ind. 1326. 1925; Hill, Ind. Kew. Suppl. 6: 23. 1926; Cowan, Rec. Bot. Surv. India 11: 203 & 220. 1928; J. G. Wats., Malayan Forest Rec. 6: 59 & 60. 1928; Hill, Ind. Kew. Suppl. 7: 23. 1929; Ridl., Dispersal Pl. 310. 1930; Troll & Dragendorff, Planta [Arch. Wiss. Bot.] 13: 330. 1931; Clason-Laarmon, Trop. Natuur. 21: 26. 1932; P'ei, Mem. Sci. Soc. China 1 (3): 186. 1932; Crevost & Pételot, Bull. Econom. Indochine 37: 1297. 1934; Junell, Symb. Bot. Upsal. 4: 140--143, 146, & 209. 1934; Schimper & Faber, Pflanzen-geogr., ed. 3, 1: 39 & 567. 1935; Dop in Lecomte, Fl. Gén. Indochine 4: 892. 1935; H. Walter, Bericht. Schweiz. Bot. Gesell. 46: 217. 1936; Walter & Steiner, Zeitschr. Bot. 30: 138--145, 155, 156, 158--161, 163, 165, 167--169, 175, 176, 178--180, 189, & 190. 1936; Moldenke, Geogr. Distrib. Avicenn. 29--35. 1939; Cormio, Avic. marina 1--11. 1939; Allen, Trop.

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- Illustrations: Bruce, *Trav. Abyss. & Nub.* 5: app. 44—46 (colored). 1790; Griff., *Trans. Linn. Soc. Lond. Bot.* 20: 6 & 7, pl. 1, fig. 8 & 11. 1846; Griff., *Ann. Sci. Nat. Bot.*, ser. 3, 7: 11 & 12, pl. 1, fig. 8 & 11. 1847; Schnitzlein, *Iconogr.* 2: pl. 137** (colored). 1856; J. Schmidt, *Bot. Tidsskr.* 26: fig. 28—30 & 43 (8). 1904; J. Schmidt in Karst. & Schenck, *Veget.-Bilder* 3: pl. 38. 1906; Sim, *For. Fl. Cape Col.* pl. 120, fig. 3. 1907; Sim, *For. Fl. & Res. Portug. E. Afr.* pl. 83. 1909; Engl. in Engl. & Drude,

Veget. Erde 9 [Pflanzenwelt Afr. 1 (1)]: pl. 45, fig. 202. 1910; Hayata, Acts Bot. Cong. Bruxelles 2: pl. 12--14. 1912; Bews, Journ. Ecol. 2: pl. 22. 1914; Kanehira, Formosan Trees 394. 1917; H. J. Lam, Verbenac. Malay. Arch. pl. 3, D, G, J, & K. 1919; Bakh., Bull. Jard. Bot. Buitenz., sér. 3, 3: pl. 14--19. 1921; H. Walter, Bericht. Schweitz. Bot. Gesell. 46: 217. 1936; Record & Hess, Timbers New World pl. 14. 1943; E. D. Merr., Pl. Life Pacific World fig. 55. 1945; E. H. Walker, Smithson. Rep. 1952: pl. 10. 1953; Moldenke in Humbert, Fl. Madag. 174bis: fig. 1. 1956.

Low or large, erect, willow-like, much-branched tree or shrub, to 10 m. tall, sending out soft, radiating, horizontal roots about 6 inches below the surface of the ground, with many erect finger-like tapering pneumatophores about 10 cm. tall; trunk to 25.5 cm. in diameter and 60 cm. in circumference, often with many aerial roots along the trunk to a height of 2 m., not reaching the ground; bark smooth, varying from white or grayish-white to olivaceous; wood white or pale, heavy, hard, burly, with a turnip-like odor; branchlets and twigs rather slender, decussate, subterete or quadrangular, densely pulverulent-puberulent with buff, grayish, or whitish furf, or sometimes merely obscurely pulverulent and brown in color or even glabrate (after the thin outer whitish or grayish densely pulverulent-puberulent bark has worn off); nodes swollen, conspicuously annulate, articulate; principal internodes 0.8--7.6 cm. long; leaves decussate-opposite, often described as silvery or (by Volkens) light-green on both surfaces, slightly whitish beneath when fresh; petioles rather stout, 3--14 mm. long, flattened above, mostly longitudinally wrinkled beneath in drying, ampliate at the base, usually densely pulverulent-puberulent or tomentellous with incanous, cinereous, or greenish-yellow furf, rarely only very obscurely so or even glabrate; leaf-blades firmly chartaceous, subcoriaceous, or coriaceous, usually light-green on both surfaces or silvery beneath when fresh, very dark-green and shiny above when dry, mostly brunnescent or nigrescent in drying, varying from sordid-gray or white to flavidous beneath, varying from ovate or lanceolate to lanceolate-oblong or elliptic, 3.5--12 cm. long, 1.3--5 cm. wide, usually rather abruptly acute at the apex, more rarely sharply acute, entire and with the margins usually very slightly subrevolute, acute or acuminate at the base and prolonged into the petiole, more or less obscurely pulverulent or glabrous and sometimes more or less resinous- or impressed-punctate above, densely pulverulent-puberulent with cinereous or incanous to flavidous furf beneath; midrib slender, prominulent above and sometimes very obscurely canaliculate at the base, rounded-prominent beneath, extending through to the apex on both surfaces; secondaries very slender, 8--15 per side, irregular, arcuate-ascending, rather indistinctly anastomosing in many irregular loops at the margins; tertiaries about similar to the secondaries in thickness and, like them, prominulent on both surfaces, but usually obscured by the furf beneath; veinlet reticulation rather abundant, subprominulent above, usually hidden by the furf beneath; inflorescence axillary and terminal, the axillary inflorescences mostly soli-

tary in each axil (rarely paired), 1.5--5 cm. long, 7--15 mm. wide, mostly capitate or subcapitate, occasionally short-spicate with about 2 opposite flowers borne a slight distance below the terminal cluster of 3 or 5; terminal inflorescences arranged in paniculate fashion, subfoliose, the cymes few- or many-flowered; peduncles stout or slender, 0.6--4 cm. long, deeply sulcate in drying, similar to the twigs in puberulence, but the furf usually more sordid or flavidous and denser; flowers sessile, odorous, usually without a marked blooming season; the single bractlet and 2 prophylla ovate or broadly ovate, about 2.5 mm. long, concave, obtuse or rounded at the apex, glabrous on the inner surface, densely silvery-tomentose or sericeous along the margins and on the back or glabrescent; calyx small, urceolate, about as long as the corolla, green, its tube very short, the lobes imbricate, rounded-ovate or broadly ovate to elliptic, 2--4 mm. long, rounded at the apex, glabrous on the inner surface, pubescent on the back and ciliate along the margins; corolla white, soon turning yellow or orange to dark-orange or red-orange, rigid, blackening after drying, deciduous, its tube campanulate, 1--2 mm. long, equaling or shorter than the calyx, the lobes 4, usually yellow, varying from ovate or rounded-ovate to oblong, 3--4 mm. long, radiately patent and erecto-patulous, glabrous on the inner (upper) surface, densely and minutely tomentose or sericeous on the outside except at the apex; stamens very shortly exerted, sometimes black; filaments short, erect; anthers black, subrotund, compressed, about as long as the filament; style filiform, narrower than and half as long as the ovary or subobsolete, smooth, yellow; stigma manifest, as long as or shorter than the style, subsessile, filiform, obtuse; fruiting-calyx hardly changed, the bractlet, prophylla, and sepals densely puberulent on the outer surface, closely appressed to the base of the fruit; fruit yellowish-green or pale-green to grayish-green, ovate or conic, 1.2--2.5 cm. long, 7--20 mm. wide, mucronate or rostrate at the apex and mostly somewhat asymmetric (at least when young), densely cinereous- or incanous-pulverulent, distinctly beaked when young, usually not beaked when mature, dehiscent while still on the tree; seed one, large, compressed; cotyledons reniform, light-green, punctate; radicle cylindric, hirsute at the base.

This very variable and widespread species is found in its typical form from Egypt and Arabia, along both shores of the Red Sea and the western Indian Ocean to the Cape of Good Hope, eastward along the shores of the Arabian Sea, the Bay of Bengal, the northern and eastern Indian Ocean, the South China Sea north to Hongkong and Formosa, and the islands of the Philippine Sea, Coral Sea, and South Pacific to New Zealand. It inhabits tidal mud-flats, low ground flooded by salt-water, seashores, swamps, rocky beaches, and salt-water. It is said to be common in mangrove swamps in Thailand and very common in Tanganyika at the edge of the sea, on sand in seawater, in estuaries, and the maritime zone in general. Kirk states that it is "confined to the region bounding the coast and up the rivers about three miles". Cooper says that it is found "in the muddy seashore"; Slade reports "growing

in the salt water"; Fisher found it "in swamp near the seacoast"; and Aylmer found it "in the sea". Mrs. Taylor describes it as a "spreading bush in mangrove swamps". Usually it grows at sea-level, but Miss Franks reports it in Natal from an altitude of 101 feet! It has been collected in anthesis in every month of the year except January, and in fruit in January, February, April, and July to October. In Lourenço Marques it is said to bloom from August to October. In Selangor it grows in association with Scyphiphora hydrophyllacea Gaertn. f. The wood is used for fire-wood and for making poles in Lourenço Marques, and the plant is said to have medicinal uses. Bruce, in his Trav. Abyss. & Nub. 5: app. 45 (1790) says "The Arabians, it is said, make boats of this tree. Its wood is so hardened by the sea, and also so bitter in taste, that no worm whatever will touch it. Of this tree the Arabians also make tooth-picks, these they sell in small bundles at Mecca, and are reported to be favourable to the teeth, gums, and breath." He reports the species on Toulahout Island, Eritrea -- I am assuming that this is the "Toalut" of Ehrenberg. Gómez de la Maza reports that the Arabs use the mucilaginous root as an aphrodisiac.

Among the vernacular names recorded for the species in its typical form are "afiafy", "apiapi", "api-api", "api-ápi", "api-api merah", "apiapi puteh", "api-api puteh", "api-api putik", "apiapy", "avicenne résineux", "bina", "biná", "boak", "bufigálan", "bufigálon", "bungalon", "bufigálu", "bufigálor", "cheriá", "chobougi", "cuancua", "cuancuan", "dudli baen", "fika-fika", "harav", "honko", "imbeda", "imvetu", "kalapíni", "kalapíni mafigitit", "kalapíni-maputi", "kapoe neri", "kausia", "kiapiapi", "koak", "kolo-kolo", "kulási", "kuyápi", "lame apyu", "lame-apyu", "lechobazi", "lifigig", "lifigog", "mabaran", "mada-chettu", "mangrove blanc", "mavete", "m'candella", "mchu", "miapi", "miápi", "moosa", "mtschu", "nalla-mada", "oepata", "piápi", "piksik", "pipisig", "pipisik", "rack", "rack-tree", "red api-api", "renggou", "sagarai", "salgiero", "samair kao", "showarab", "shúra", "smae khao", "timmer", "tioes léwo", "tivar", "tobose", "tobucho", "upputti", "white api-api", "white mangrove", "white willow mangrove", and "witte mengerhout". It is worth noting that the name "oepata" is also, and perhaps more correctly, applied to A. officinalis L., while "white api-api" is applied also to A. lanata Ridl. and A. officinalis.

The type of A. marina was collected by Pehr Forskål at the edge of the Red Sea in Yemen, Arabia, and is deposited in the herbarium of the British Museum in London. Its leaf-blades are abundantly resinous-punctate above. Hildebrandt 3234, from Madagascar, has them slightly punctate. The type of Halodendrum is Herb. Petit-Thouars s.n. in the herbarium of the Muséum National d'Histoire Naturelle at Paris. The type of A. officinalis var. ovatifolia f. flaviflora is Kuntze s.n., collected in Zanzibar in April, 1894, and is deposited in the herbarium of the Botanisches Museum at Berlin, and of f. tomentosa is Kuntze s.n., collected in Zanzibar on April 9, 1894, and deposited in the United States

plant with the Cuban A. germinans ("A. nitida Jacq.") and says "Según Gómez de la Maza, la resina....la usan como alimento los neo-hollandeses y las hojas verdes, cocidas con las hojas verdes de la Ipomoea campanulata Lin. sirven para hacer cataplasmas emolientes. Agrega que los árabes usan la raíz mucilaginososa y salada de esta planta como afrodisíaco, propiedad que debe a su acción corroborante y dinamódora."

Cuatrecasas in Bol. Soc. Bot. Mex. 23: 91 (1958) refers to an ecologic association which he calls "Avicennietum marinae". Walter & Steiner, in the reference given above, found the osmotic pressure in this species to range from 35 to 46 atmospheres. Ridley, in his Dispersal of Plants, page 310 (1930), suggests that A. intermedia is a hybrid between A. officinalis and A. alba. Personally -- as I have pointed out in Am. Midl. Nat. 59: 333--334 (1958) -- I feel that hybrids must occur very often where several species or varieties of this genus grow together. Such hybridity may account for some, at least, of the puzzling intergrading specimens.

Record & Hess, in their Timbers of the New World, pages 72--73 and 593, plate 14 (1943), adopt the name A. marina for the common New World species and reduce Jacquin's A. nitida to synonymy under it. This is an utterly inexplicable opinion, which, unfortunately, has been followed by several other contemporaneous authors without investigation. Pearson, Fl. Cap. 5 (1): 225 (1910) uses A. officinalis as the name for the species here under discussion and reduces to synonymy under it the names A. tomentosa Jacq., A. africana P. Beauv., and A. meyeri Miq. The first and third of these, of course, are actually A. germinans, while the second is regarded by me as a separate species. He affirms that the plant is found growing in association with Rhizophora mucronata Lam. and Bruguiera gymnorhiza Lam. and "also on the tropical shores of both hemispheres". He cites a Peddie s.n. not as yet seen by me. Baker, in Thiselton-Dyer, Fl. Trop. Afr. 5: 332 (1900) cites Quarton-Dillon s.n. from Eritrea and Terracciano s.n. from the "Bay of Anfilah, Somaliland", not as yet seen by me.

Germinating seeds and young seedlings are seen on the Bent s.n. specimen in the Kew herbarium, while Yates 948 and 949 in the University of California herbarium show fungus-infested leaves; Drège 4102 at Berlin includes a specimen of bark. Merrill 2488 in the herbarium of the Missouri Botanical Garden exhibits many of the characters of var. rumphiana and may indicate that this collection represents a hybrid plant. The Teijsmann 1753 H.B. collection is a mixture with material of A. officinalis. Peter 31048 is a mixture with something not avicenniaceous.

The Poiteau s.n. in the DeCandolle Herbarium is inscribed "St. Dom.", but surely in error. The Junod 500 specimen at Kew bears a notation indicating that it is from Natal, but all other sheets of this number are marked as being from Mozambique, and I

am citing it herein from the latter country. The G. Gardner 236 specimen in the Paris herbarium bears a printed label reading "Brésil" and was on this account previously misidentified as A. schaueriana -- I believe now that this plant was probably collected in Ceylon and is A. marina.

Previous records of this typical form of A. marina from New Zealand given by me are erroneous, being based on a United States Exploring Expedition [Wilkes] specimen in the Torrey Herbarium which proves actually to be var. resinifera.

Numerous herbarium specimens of this species, in various herbaria, have been misidentified as A. officinalis L., A. alba Blume, A. africana P. Beauv., A. nitida Jacq., A. officinalis var. alba (Blume) C. B. Clarke, Bruguiera gymnorhiza Lam., "Piptotaenia dregei", and even Carallia sp. Merrill 2488 has been misidentified as A. marina var. rumphiana (H. Hallier) Bakh., while Copeland 558, Elmer 11990, and Merrill 1179, 2413, and 2585 has all been misidentified in the past as A. marina var. resinifera (Forst.) Bakh. Schweinfurth annotated his no. 965 as "A. officinalis var. folii variegati".

Other mangroves of the east African coast are Bruguiera gymnorhiza Lam. (Rhizophoraceae), Ceriops candolleana Arn. (Rhizophoraceae), Lumnitzera racemosa Willd. (Combretaceae), Rhizophora mucronata Lam. (Rhizophoraceae), Sonneratia alba J. Sm. (Sonneratiaceae), and Xylocarpus obovatus A. Juss. (Meliaceae). On all of these species of Loranthus are parasitic.

The collector, Johann Georg Teede, has his surname misspelled "Taede" in the British Museum herbarium and "Tiede" in the Berlin herbarium, while Nicolaas Laurens Burman often has his surname misspelled "Burmarm".

The "Avicennia officinalis L." pictured by J. Schmidt in Karst. & Schenck, Veget.-Bilder 3: pl. 38 (1906) from Koh Chang Island, Thailand, is probably A. marina, as is the herbarium specimen gathered by this collector, cited below.

In all, 1096 herbarium specimens, including the types of all the names involved, and 60 mounted photographs and drawings have been examined.

Citations: EGYPT: B. K. Cooke 147 (K); Drar 42 (S), 95/1140 (N), 126 (S); C. G. Ehrenberg s.n. [Promont. Ras Muhammed] (B, K, X), s.n. [R. de Mahommed, Sinai] (P), s.n. [Penins. Sinai] (B, N-photo, Z-photo); Frauenfeld s.n. [Sinai] (V); A. Kaiser 909 (S, X), 948 (X), 980 (X, X); Schweinfurth 61 (X), 965 (B, B, Bm, K, N-photo, V, X, Z-photo), 966 (B, Bm, K, N-photo, V, X, Z-photo); G. V. Tackholm s.n. [21/1/1929] (S, S), s.n. [23/1/1929] (S); Wilkinson s.n. [1834] (Bm). SUDAN: Nubia: Bent s.n. [1896] (K). Red Sea: Acerbi s.n. [Red Sea, 1831] (Dc); Bové 299 (Le), s.n. [Red Sea] (V); C. G. Ehrenberg s.n. [Red Sea] (Le); Herb. Courbon 19 (P); Kahvin s.n. [Red Sea] (V). ERITREA: C. G. Ehrenberg s.n. [Massaua]

(B, B); Pappi 197 (B, Bm, Cb, K, V); Schweinfurth & Riva 44 (X), 61 (K, X); Stuedner 1307 [207] (B, K, N--photo, Z--photo); Tellini s.n. [27.XII.1902] (N). SCHECH SA'ID ISLAND: Beccari s.n. [Schech-Sa'id] (B); C. G. Ehrenberg s.n. [Scheik Sa'id Isl.] (K, X); J. M. Hildebrandt 731 (B, Bm, Le V); Pappi 3168 (Bm). TOULAHOUT ISLAND: C. G. Ehrenberg s.n. [Toalut Isl.] (S). MARDUNA ISLAND: C. G. Ehrenberg s.n. [Marsanam] (Cp, Cp, Le, P). ADJUNA ISLAND: Salt s.n. (Bm). ABU MENQAR ISLAND: Adham s.n. [Feb. 1939] (Z--photo); Nasr s.n. [Feb. 1939] (Z--photo). ABYSSINIA: H. M. Arnaud s.n. (P); Jalt s.n. (Cb); Petit s.n. [Chire] (B, B); Quartin-Dillon & Petit s.n. [1844] (P), s.n. (V). BRITISH SOMALILAND: Drake-Brockman 437 (B), 444 (K), 746 (B); Playfair s.n. [Aloola, near Bunder Murayah] (K). SAAD-ED-DIN ISLAND: E. M. Godman 151 (Bm). HARNISH ISLAND: Slade 2 (K). FRENCH SOMALILAND: Debeaux 255 (P, P). TANGANYIKA: Braun 1181 (B, B, B); Burrows s.n. [Oct. 10, 1934] (A, N, N, N, Y); Burt 199 (Bm, K), 4468 (K); Busse 405 (B, Bm, Cb, Cb, K, Le, V); Collector undesignated 4074 (B); Engler 2227 (B, B, N--photo, Z--photo); H. G. Faulkner 546 (S), 1574 (S), 1591 (S); J. M. Hildebrandt 1241 (B, B, K, V, V); Holst 3059 (B, K, Mu--1728, V); Kässner 25 (B, Bm, K); Koerner 2262 (B); Kuhlmann 7490 (Us); Migeod 391 (Bm); A. Peter 14586 [O.III.222] (B), 14846 [O.III.231] (B), 15101 [O.III.241] (B), 22820 [O.IV.274] (B), 22864 [O.IV.276] (B), 23734 [O.IV.311] (B), 23735 [O.IV.311] (B), 39617 [V.208] (B), 44794 [V.344] (B), 45115a [V.353] (B), 51794 [O.IV.249] (B); Schlieben 2547 (B, Bm, Br, Cb), 5787 (B, B, Bm, Br, N--photo, S, Z--photo); Stuhlmann 7490 (B), I.6 (B), s.n. (B); Verdcourt & Greenway 132 (S); Volkens 160 (B, B, Br, K, N--photo, Vu, X, Z--photo), 1241 (Bm); G. B. Wallace 728 (K); Wigg 474 (Af, Af, Af). ZANZIBAR: Boivan s.n. [9bre 1848] (B), s.n. [1847--1852] (P, P, P); Engler 318 (B, N--photo, Z--photo); P. J. Greenway 1338 (K); Kuntze s.n. [Zanzibar, 9/4/94] (N, N--photo, W--694897, Z--photo), s.n. [Zanzibar, IV.94] (B, N--photo, Z--photo), s.n. [1/10/94] (X), s.n. (K); Stuhlmann I.760 (B); Mrs. Taylor 375 (K). KENYA: Bathscombe 617 (B); R. M. Graham 251 [367] (B, Bm, Br, K, W--1429953); J. W. Gregory s.n. [Jakonunbi, 1893] (Bm); Linck s.n. [Osi] (B, B); Mearns 2145 (Bm, Bm, Br, Cp, N, P, W--632111), 2154 (Bm, F--468339, K, N, W--632120); A. Peter 17578 [O.IV.94] (B); Teede 35 (B, Bm, N--photo, Ol, Ol, Z--photo); Wakefield s.n. [Mombasa, Nov. 1884] (K); C. W. Webber 617 (K). LAMU ISLAND: Mrs. Thomas 216 (B, Bm, K, N--photo, Z--photo). PORTUGUESE EAST AFRICA: Gazaland: Swynnerton 1901 (Bm, K). Inhambane: W. C. H. Peters s.n. (B, K); Sahelpe 4427 (Bm). Lourenço Marques: J. Borle 3 (Af--22684, Br, Us, V, V), 114 (Af--22678); Coomans s.n. [XI.07] (Lu); H. M. L. Forbes 90 [36] (P); E. E. Galpin 7887 (Af--22679); F. Gomes e Sousa

3793 (S); Pole-Evans H.16929 (Af--22687); F. R. R. Schlechter 11581 (Af--22681, B, B, Bg, Bm, Br, Cb, Cb, Ct, Ed, K, Le, P, S, V, W--553276, X). Mozambique: Coomans s.n. [XI.07] (Lu); W. H. Johnson 18 (K, P); Junod 500 (B, Br, Cb, K, X); J. Kirk 11 (K), 45 (K), s.n. [mouth of Zambesi, Jan. 1861] (K), s.n. (K--drawing, K--drawing); A. Peter 31048 (B), 51245 [S.73] (B, B); Shantz 365 (K); Stocks 2 (K). UNION OF SOUTH AFRICA: Cape of Good Hope: H. W. Buek s.n. (Le); Drège s.n. [Cap] (Cb, Lu, P, P); O. H. Miller s.n. [Pegler 2130] (Af--22686, Af, Ct); Mogg s.n. [Jan. 1933] (S); Sim s.n. [Elliotdale, May 1901] (Af--22680); Soga 1941 [MacOwan 1899 & 3203] (B, B, K, Us), s.n. [MacOwan 1941] (Bm, Cb, Ct, P); Wager s.n. [Jan. 1929] (Af, N). Natal: T. Cooper 1233 [Herb. Bolus 1253] (Ct, K); Drège 4102 (B), s.n. [Port Natal, 1838] (Dc), s.n. [1838] (Ol, V), s.n. [1844] (M), s.n. [Port Natal] (Cb), s.n. (B, Bm, K, K, S, V, V, X); G. F. S. Elliot 1712 (Ed); H. M. L. Forbes s.n. [Isipingo] (Cp); Forbes & Obermeyer 15 (Na--26899); Franks s.n. [Isipingo] (Na--12498); Fries & Fries 3020 (S); Gueinzus 195 (V), 458 (V, X), 539 (V), s.n. [Port Natal] (S, S), s.n. (Af); Haptröm & Lindberg s.n. [23 Aug. 1936] (S, S); W. H. Harvey s.n. [1840] (K); Hutchinson, Forbes, & McClean 7 (Na--20884); C. F. F. von Krauss 241 (Af--13967, Bm, Cb, K), s.n. [Juni '39] (Mu, V), s.n. (X); G. Lindeberg s.n. [23 August 1936] (S); Lüttjeharms 5284 (S); Meebold 12828 (Mu); Plant 21 (Bm, Cb, Cl, K, N, P, S, S, V, X); Rehmann 9004 (B, Bm); Rudatis 1259 (B, Bm, Ed, K); Sanderson 886 (Ct, Na--1175), s.n. (K); Setchell & Setchell s.n. [Apr. 27, 1927] (Ca--312649); Thode A.1521 (Af, Na--24918); Van der Eyl s.n. [Marloth 9397] (Af--22682, Na--16080); Wahlberg s.n. [Goda] (S, Us), s.n. [Port Natal] (S); Wilms 2229 (Bm, K); J. M. Wood 395 (Bm), 1360 (Ct, K, Na--11012), 12973 (I, VI). SALISBURY ISLAND: H. M. L. Forbes 64 (Na--17242), 325 (Na--18367); Moonsammy s.n. (Na--17112). EUROPA ISLAND: Voeltzkow 285 (B). COMORO ISLANDS: Aldabra: W. L. Abbott s.n. [Oct.--Dec. 1892] (W--287131), s.n. [Aldabra Isl.] (B, P); Gardiner 22 (K). Grand Comoro: Humblot 182 (P), 1003 (B, Bm, K, N--photo, P, Z--photo). Mayotte: Boivin 3226 (P). Mohelli: J. Kirk s.n. [April 1861] (K). SEYCHELLES ISLANDS: Astove: D. V. Fitzgerald 5960 (B). Mahé: Boivin s.n. [Mahé] (P); Gardiner X.4 (K), s.n. (K); Pervillé 121 (B, Le, P, P). Praslin: J. Horne 302 (K). NOSY-BÉ: Boivin 2083 (P); Pervillé 324 (P, P), 325 (P). MADAGASCAR: K. Afzelius s.n. [Majunga, 12.4.1912] (K, S), s.n. [16.5.1912] (S, S), s.n. [16.6.1912] (Us); Aubert s.n. [Herb. Jussieu 5084] (P); Baron 5871 (P), 5872 (Bm), 6727 (B), s.n. (K); Boivin 2486 (P); Bojer 160 (P), II.87 (V), s.n. [1839] (Dc), s.n. [Bé-tsi-Bouka] (K); Collector undesignated 328 (B); D'Alleizette 1423m (P); Decary 2178 (P); Grévé 328 (B, K, K, P), s.n. [Madagascar] (Ca--616081); Herb. Alstroemer s.n. (S); J. M. Hildebrandt

3234 (B, B, Bm, Cb, Cb, K, Mu--1664, P, X, X); Humbert 3952 (B); Martin 20 (Cb, Cb); Oldenburg s.n. (Th); J. M. H. A. Perrier de la Bâthie 1197 (P); Pervillé 324 (K, Le), 325 (K), 326 (B, Le), 329 (B, E--photo, N--photo, Z--photo); Thunberg s.n. (S, S); Viguiier & Humbert 56 (B, P). ARABIA: Hejaz: Botta s.n. [1837] (P, P); Zohrab 310 (K, X). Schoro: Herb. Courbon s.n. [Chora] (P, P); Schimper 736 [Herb. Prager 18690] (B, B, B, Bm, Cb, Cb, Cl, Dc, Dr, Du, Ed, Gg--31939, K, Le, Le, Mu--1076, P, V, V, V, V, V, Vu, X, X, X); Shabetai F.1819 (K). Yemen: Bové 229 (B, Br, Cb, Dc, K, P), s.n. [1834] (Us), s.n. [Arab. fel.] (P); Collector undesignated s.n. (Cl); Deflers 30 (P); Forskål s.n. (Bm--type). Province undetermined: C. G. Ehrenberg s.n. [Toavent] (B); Hennecart s.n. [1838] (P); Paulay s.n. [26.XI.98] (Vu); Philby 38 [Wadi Humair] (Bm); Schimper s.n. [Arabia] (V); Simony s.n. [26.XI.98] (Vu, Vu, Vu, Vu, Vu, Vu, Vu). GENOBI ISLAND: C. G. Ehrenberg s.n. [Genobi; Herb. Mus. Nac. Hist. Nat. Chile 16023] (B, B, Cp, K, Le, Sg, X); Ehrenberg & Hemprich s.n. [Genobiat Isl.] (B, P). KAMARAN ISLAND: Faurot 7 (P, P). GORALES ISLAND: Botta s.n. [Ile Goraless] (P). DISSEE ISLAND: Herb. Courbon s.n. [Ile Dissée] (P, P, P). SOCOTRA ISLAND: I. B. Balfour 559 (K). BAHRAIN ISLANDS: R. Good 247 (Bm). INDIA: Madras: Beddome 6536 (Bm), 6537 (Bm); Bourne & Bourne 2334 (K, K), 3015 (K); Cleghorn s.n. [Sept.1856] (Ed); Cornwell 1 (Dd, Dd), 3 (Dd, Dd); Dalm s.n. [Trincmalie, Aug. 13, 1860] (Ed); C. E. C. Fischer 4114 (Cl, Cl), 4769 (Cl, Cl), s.n. [Tummalapenta, 13/9/1922] (K, K); Foulkes 108 (Cl); Gamble 12191 (Cl, Dd), 12668 (Dd, K), 12824 (Cl, Dd), 13502 (K), 17673 (Bm, Cl, Cl, K), 18173 (Bm), 20778 (Cl, Dd); Herb. Hooker s.n. [Madras] (K); Herb. Madras 1747 (Cl), 13712 (K, N, N--photo, Z--photo); Heyne s.n. [Samulcotta, 1811] (K); Homfray s.n. [Sept. 1885] (K, K); König s.n. [Coromandel] (Bm); Ramachandran s.n. (Gg--213786); Ramaswami 512 (Cl); R. Wight 2329 (Cl, K, Le, Le, Le), 2599, in part (Ed), 2600 (Ed), s.n. [Penins. Ind. or.] (Cl, Ed, Ed, Ed, K, N, P). Orissa: Mooney 3394 (N). West Bengal: Biswas 744 (Cl), s.n. [Chakaria] (Cl, Cl); C. B. Clarke 21662 (Cl); Collector undesignated 218 (Bz--16971); Gamble 10115 (K); Janardan s.n. [Matla, June 14, 1899] (Cb); Kurz s.n. [Mutlah] (Cl, Cl, Cl), s.n. (Mu--1166); Nath 335 (Dd), 4134 (Dd, Dd, Dd), 4134a (Dd). State undetermined: Herb. Bernhardt s.n. [Ind. orient.] (E--118592); Herb. Trattinick s.n. [Ind. orientali] (V); Herb. Vahl s.n. [Ind. orient.] (Cp); Herb. Wight 1742 (Cl); Hohenacker 68, in part (Le); Wallich 1742, in part (B, Cl), 1742d (B, B), 1742e (B, B); R. Wight 1313 (Ed). FRENCH INDIA: Contest-Lacour s.n. [1868] (Lu). DIAMOND ISLAND: Prain s.n. [30 Nov. 1889] (Cl, Cl). GREAT COCOS ISLAND: Prain s.n. [1890] (Cl), s.n. [April 1891] (Cl). BURMA: Tenasserim: H. Falconer 388 (Le), 2416 (Bz--

16970); Khant 11365 (Dd). ANDAMAN ISLANDS: South Andaman: King's Collector s.n. [Apr. 1891] (W--261899); Kurz s.n. [South Andaman] (K, Mu--1165, P). Island undetermined: G. King s.n. [2-5-91] (Dd); King's Collector 300 (Cl), s.n. [19-5-1893] (Cl, Ut); Kurz s.n. [Perseverance Bay] (Cl), s.n. [1867] (Cb), s.n. (Cl, Cl); Lace 2834 (Cl, Dd, K); Prain s.n. [Apr. 1891] (Dd); Prain's Collector 4 (Cb), 74 (B, Cb, Mu--3923, X). CEYLON: Claghorn s.n. [Northern Division] (Cl); G. Gardner 236 (P); Herb. Forest Research Instit. Dehra Dun 35684 (Dd), 35685 (Dd); Herb. Hort. Bot. Perad. s.n. [Aug. 1883] (B); Herb. Lenormand s.n. (S); Herb. Peradeniya 488 (A, G, N, N, N, N, W, Y); Holtermann 13 (B), 21 (B), s.n. [5/2/90] (B), s.n. [Feb. 1890] (B); N. D. Simpson 8189 (Bm), 9850 (Bm), 9944 (Bm); Thunberg s.n. [Ceilonia et Java] (Th); Thwaites 1961, in part (B, Bm, Cb, Cb, Cl, K, K, P, V, X), s.n. (Vu); G. W. Walker 45 (Ed); Mrs. Walker s.n. (B); Worthington 529 (Bm), 1014 (Bm). CHINA: Kwangtung: How & How 469 [Herb. Lingnan Univ. 19649] (N). Province undetermined: A. Henry s.n. [June 16] (N), s.n. [Dec. 5] (N); Meyen 11724 (B, N--photo, Z--photo), 11725 (B, N--photo, Z--photo). KULUNGSU ISLAND: Sampson s.n. [Kulungsu Isl., opp. Amoy] (Bm). FORMOSA: A. Henry s.n. [Takow] (B, N, W--455095, W--455863); Herb. Univ. Imp. Tokyo wood spec. 5799 (N); Playfair 160 (K, N--photo, Z--photo); W. R. Price 611 (K, N--photo, Z--photo); Simada 210 (Ca--344900); Swinhoe s.n. [Takow] (K, N--photo, Z--photo); T. Tanaka 5467 (Bm, Cp, P). HONGKONG: C. Ford s.n. [July 1879] (K, N--photo, Z--photo); Sampson s.n. [Herb. Hance 11735] (Bm). HAINAN ISLAND: F. C. How 70896 (B, F--780167, N); Lei 1222 (I); C. Wang 33830 (N). INDOCHINA: Annam: Poilane 12345 (P). Cochinchina: Collector undesignated 75 (P); Kuntze 3923 (N, N); Pierre s.n. [1874] (B), s.n. [1876] (P), s.n. (P); Thorel 289 (P), s.n. (P). Tonkin: Balansa 941 (P); Bon 5548 (P, P, P), 5641 (P, P); Pételot 4546 (N), s.n. [24 juin 1932] (P), s.n. [Juillet 1932] (W--1577681), s.n. [Août 1932] (N, N, P, W--1577680). State undetermined: Chevalier 61 (P, P). PHUQUOC ISLAND: Pierre s.n. [Apr. 1874; Herb. Hance 11735] (Bm). THAILAND: Herb. Roy. Forest Dept. Siam 1 (N); A. F. G. Kerr 2095 (K, N--photo, Z--photo); Lakshnakara s.n. [Paknam, July 14, 1934] (F--752075, N); Marcan 855 (Bm); Pierre 4 (B, P, P, P, P, P); J. J. H. Schmidt 38 (Cp); Smitinand 1463 (Z). MALAYA: Malacca: W. Griffith 6070 (K), s.n. [Malacca, 1845] (Bm, Br), s.n. [Malacca] (K). Penang: C. Curtis 3533 (K, K, Mi--photo, N--photo, N--photo, Z--photo, Z--photo); Haniff 277 (Ca--355086, Cp, La); Herb. Forest Dept. F. M. S. 16714 [timber spec. 2438] (N), 16715 [timber spec. 2439] (N). Perak: Scortechini 963 (Ca--528991, Cl, Cl, K, K, K); Seimund s.n. [Pulau Lalang, Nov. 22nd 1925] (Bz--16964, Ca--360531). Selangor: Burkill & Shah 979 (Ng--20207); Ridley s.n. (Bz--16969). Singapore: M. R. Henderson 18642 (Bz--16965).

Wellesley: J. G. Watson 10504 (Ed). LIUKIU ISLANDS: Iriomoto: Walker & Tawada 6566 (Le, N). PHILIPPINE ISLANDS: Cebu: M. Ramos s.n. [Herb. Philip. Bur. Sci. 11128] (Cm, F--425269). Cuyo: Kienholz s.n. [Herb. Philip. Bur. Sci. 15543] (Ca--262763). Leyte: Wenzel 1449 (Bm, Cb, Cb, Cl, E--800462, E--800463, F--441094). Luzon: Ahern's Collector 140 (W--1584130), s.n. [Merrill, Dec. Phil. For. Fl. 140] (It, Os); R. J. Alvarez s.n. [Herb. Philip. Forest Bur. 22653] (Gg--31942); J. J. Bennett s.n. [Luçonía] (B); J. Clemens s.n. [Manila, April 1925] (Ca--268457); Curran s.n. [Herb. Philip. Forest Bur. 10324] (Br, E--118603); Franco s.n. [Herb. Philip. Forest Bur. 22848] (E--836067); H. Hallier 3520 (Le); Herb. Com. Fl. Forest Filip. 496 (Le); Kienholz 161 [Herb. Philip. Bur. Sci. 15243] (Ca--263021); Klemme s.n. [Herb. Philip. Forest Bur. 4278] (Bz--17072); Loher 4450, in part (Cl, K, Mu--3922, N, W--446888, Z--photo), 5040 (K, N--photo, Z--photo), 14861 (Ca--243083); E. D. Merrill 2488 (B, Cl, E--118601, K, N, W--437445), 2585 (B, Bm, K, N, W--437549); Perrottet s.n. [Manila, 1823] (Dc); Whitford 579 (F--401859, P). Mindanao: E. B. Copeland 558 (Cb, K, N, W--850463); Elmer 11990, in part (Bm, Br, Bz--17073, E--118605, F--291316, N, N--photo, S--photo, Z--photo); W. I. Hutchinson s.n. [Herb. Philip. Forest Bur. 3947] (Bz--16930); A. de Mesa s.n. [Herb. Philip. Forest Bur. 27612] (Ca--238660, W--1262552); Piper 174 (Le). Mindoro: M. T. Cruz 7 (Ur); Kienholz 127 (Ur), 398 [Herb. Philip. Bur. Sci. 15434] (E--1018117, Ur); E. D. Merrill 1179 (B, K, N, W--436152). Panay: Curran s.n. [Herb. Philip. Forest Bur. 17337] (Bz--17074, Cl, Le); E. D. Merrill 2413 (B, K, N, W--437371); Ramos & Edayo s.n. [Herb. Philip. Bur. Sci. 31485] (Ca--213894, W--1262832). RIOUW ARCHIPELAGO: Bintan: Binnemeijer 6504 (Bz--16963). Riouw: Herb. Hort. Bot. Bogor. 9 (Bz--17054). LINGGA ARCHIPELAGO: Singkep: Haroem 16 [Boschproefst. BB.5378] (Bz--16960). SUMATRA: Bruinier 175 [Soeratman 3] (Bz--16945); Gusdorf 8 (Bz--16947); Jochems 5036 (Bz--17048); Lürzing 3831 (Bz--17049), 7285 (Bz--16946); Lwaan 14 [Boschproefst. BB. 14464] (Bz--16948); Yates 947 (Ca--234092, Ca--244189, V), 948 (Ca--234093), 949 (Ca--234094). MADURA ISLAND: Binnendijk 4 (Bz--16837); Collector undesignated 19553 (Bz--17036); DeVriese s.n. [Maduram] (Le, Le); Teijsmann 1753 H.E., in part (Bz--17037). BAWEAN ISLAND: Buwalda 3069 (Bz--73010). KRAKATOA: Leeuwen-Reijnvaan 12563 (Bz--16959). JAVA: N. J. Andersson s.n. [Batavia, Feb. 1853] (S, S); Backer 4698 (Bz--16991), 7746 (Bz--16906, Bz--16907), 16335 (Bz--16988, Bz--16989), 16711 (Bz--16990), 21441 (Bz--16992, Bz--25457), 31491 (Bz--16891, Bz--16892), 32875 (Bz--16894, Bz--16895, Bz--16896, Bz--16897, Bz--16898, Bz--16899), s. n. [18 Jan. 1903] (Bz--16999), s.n. [Aug. 1903] (Bz--16998), s.n. [Dec. 1903] (Mu--4325), s.n. [Aug. 1904] (Bz--16995, Bz--16996,

Bz--16997), s.n. [Oct. 1904] (B, Bz--16993, Bz--16994); Bakhuizen van den Brink 448 (B, Bz--17000, Bz--17001, Bz--17668, Ca--265979, Le, P, Ut), 449 (B, B, Bz--17015, Bz--17016, Bz--17017, Bz--17019, Bz--25456, Cl, Le, Le, P, P, Ut, Ut, V, X), 645 (Bz--17004), 946 (Bz--25458), 1171 (Bz--17010, Bz--17011, Bz--17012, Bz--25455, Le, Ut), 1189 (Bz--17013, Bz--17014, Bz--25695), 1421 (Bz--16900, Bz--16901), 1423 (Bz--16981, Le, Ut--24874a), 1721 (Bz--16884, Bz--16885), 1722 (Bz--16886, Bz--16887), 2127 (Bz--17002), 2128 (Bz--17003), 6747 (Bz--16879), 6753 (Bz--16976), 6767 (Bz--16878), s.n. [Batavia] (V); Banks & Solander s.n. [1770--71] (Bm); Becking 44 (Bz--17020); Beumée A.127 (Bz--16982, Bz--25450); Blume 1152 (Le, Le), s.n. (Cl, N, N, Vu); Boedijn 2669 (Bz--25459); Boschma 91 (Bz--16979, Bz--16980); Bremekamp s.n. (Bz--16987); Bunnemeijer 1528 (Bz--25460, K, P); Clason-Laarman 105 (Bz--16975); Collector indig. s.n. [12-6-'09] (Bz--16877); Collector undesignated 6 (Bz--16977), s.n. [Java] (Le); Commerson s.n. (Cb, P, P); J. Cook s.n. (Cl, Cl, Cl); DeVriese 31a (Le); Direct. Have Senarang s.n. [IX. 1934] (Bz--17005); Djaka 1 [Boschproefst. Ja.2197] (Bz--16883), 2 [Boschproefst. Ja.2198] (Bz--17018, Le), 3 [Boschproefst. Ja.2199] (Bz--16882); H. Hallier s.n. [12.XI.1894] (Bz--16873, Bz--16874, Bz--16875, Bz--16876); Hasskarl s.n. (Le); Herb. Bogor. 16984 (Bz); Herb. Burman s.n. [Java] (Cb, Cb, Cb, Cb, Cb); Hoogerwerf 12 (Bz--17233), 22 (Bz--16835), s.n. [Maart 1935] (Bz--17236); Jelinek s.n. [Exped. Novara] (V); Junghuhn 51 (Le); Karsten 3 (Le); Kollman s.n. [1838] (M); Koorders 9694b (Bz--16909, Bz--16910), 9695b (Bz--16911), 9696b (Bz--16912), 9701b (Bz--17027, Bz--17028), 13478b (Bz--16918, Bz--16919), 22009b (Bz--16914, Bz--16915), 22022b (Bz--16916, Bz--16917), 24112b [Boschwezen 1313c] (Bz--16913), 27613b (Bz--16920, Bz--16921, Bz--16922), 35729b [2258] (B, Bz--17030, Ca--265973, Le, P), 36596b (Bz--17031, Bz--17032), 37868b [1595] (Bz--17029, Le), s.n. [10.I.86] (Bz--16986), s.n. [I.86] (Bz--16985); Kuhl & Van Hasselt s.n. (Le--908265-691); Kuntze 5921, in part (N, N); Lattuye s.n. (Cb); Leeuwen-Reijnvaan s.n. [VIII.1909] (Bz--17007), s.n. [27.XI.1910] (Bz--17006, Bz--17008, Bz--17009), s.n. [6 December 1910] (Bz--16888), s.n. [20 Februarie 1912] (Bz--16974); Lürzing 862 (B); Mellerborg s.n. (S); Perrottet s.n. [1819] (Cb); Reinwardt s.n. (Le, S); Scheffer s.n. [5/10/1871] (Bz--16908); Schins 3 (Le); Slooten & Backer 35008 (Bz--16978); Teijsmann s.n. [1855] (Ut), s.n. [Poeloe Kellor] (Cl), s.n. [Semarang] (Bz--17021); Thunberg s.n. (S); Vaitz s.n. (Le); Valeton s.n. [Herb. Bot. Var. 236] (Bz--16983); Van Steenis 11551 (Bz--72762); Volkens 103 (B); Vorderman s.n. [Batavia] (Bz--17022, Bz--17023, Bz--17024, Bz--17025, Bz--17026), s.n. (Bz--16880, Bz--16881); Warburg 2388 (B); Zeylsta s.n. [1909] (Bz--16890); Zippelius s.n. (Le); Zollinger 2969 (V), s.n. [Tapera]

(Bm), s.n. (X). BATAVIA BAY ISLANDS: Leiden: Herb. Boerhage 103 (Le), s.n. [Leiden] (Le--908191-865). BANGUEY ISLAND: Castro & Melegrito 74 [1579] (Ca--241656), 1579 (Bm, Bz--16972), 1703 [198] (Bm, Ca--241334, Cb, W--1349682). SARAWAK: Native Collector 1616 (Bm). BORNEO: De Jong 477 [Boschproefst. BB.8292] (Bz--16833, Bz--16834); Hallier B.281 (Bz--16973); Van Ueurs 15 [91; Boschproefst. BB.9337] (Bz--17229). CELEBES: Boschproefst. BB.11441 (B, Ut--34196a), CC.11441 (Le), CC.15570 (Le); Forster s.n. [Celebes] (Le); Kijll de Jong 43 [E.29; Boschproefst. BB.19527] (Bz--16931); Kjellberg 2576 (Bz--16933); Koorders 19483b (Bz--17046, Bz--17047); Laleno 3 [Boschproefst. BB.11440] (Bz--16932), 4 [Boschproefst. BB.11441] (Bz--17042, Bz--17043); Noerkas 397 (Bz--17044, Bz--17045); Pesik 61 [Boschproefst. BB.15570] (Bz--17041); Rachmat s.n. [Vuuren 357] (Bz--16937, Bz--16938, Bz--16939, Le); Teijsmann 13766 (Bz--16942). KANGEAN ARCHIPELAGO: Kangean: Backer 26991 (Bz--16923, Bz--16924, Bz--16925); Dommers 62 (Bz--17033), 86 (Bz--17035). Paliat: Backer 29502 (Bz--17034). LESSER SUNDA ISLANDS: Bali: Becking 39 (Bz--16926); Collector undesignated s.n. [Bali] (Le); De Voogd 1916 (Bz--17238), 2148 (Bz--16838), 2174 (Bz--17202). Banka: Btinnemeijer 1528 (Bz--17050, Bz--17051, Bz--17052, Le); Collector undesignated 1521 (Cl); J. Cook s.n. [Banka] (Bm); Teijsmann s.n. [Toboalsi] (Bz--17053). Billiton: Teijsmann s.n. [Blitoeng] (Bz--16956, Bz--16958). Timor: Gaudichaud s.n. [1818] (Dc); Talakua 27 [Boschproefst. BB.11791] (Bz--16927). MOLUCCA ISLANDS: Obi: Hulstijn 59 (Le). Santari: Sañnan 59 (Bz--17038, Bz--17039). Taliboe: Hulstijn 114 (Le). Ternate: Beguin 932 (Bz--17040). Island undetermined: Collector undesignated s.n. (Le). NEW GUINEA: Northeastern New Guinea: Hellwig 212 (Bz--16928); Teijsmann 7459 (Bz--16929). NEW CALEDONIA: Le Rat 364 (B), 575 (B). AUSTRALIA: Western Australia: Preiss 1298 [Port Leschenault; seed 512] (B, Lu). LOCALITY OF COLLECTION UNDETERMINED: Collector undesignated s.n. (Le); Herb. Bogor. 17055 (Bz), 17956 (Bz); Herb. Linnaeus G.813, S.3 (Ls, N--photo, Z--photo); Herb. Petit-Thouars s.n. (P); Herb. Viborg s.n. (Cp); Née 56, in part (Q); Poiteau s.n. [St. Dom.] (Dc); Swartz s.n. [Herb. Rottler] (K); Tobler s.n. [Ulenge, 1913] (Dr); Warburg 15827 [Kantew] (B), 16939 [Hadjusia] (B).

AVICENNIA MARINA var. ACUTISSIMA Stapf & Moldenke ex Moldenke, Geogr. Distrib. Avicenn. 32, nom nud. (1939), Phytologia 1: 411. 1940.

Literature: Moldenke, Geogr. Distrib. Avicenn. 32. 1939; Moldenke, Phytologia 1: 411. 1940; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 54 & 86. 1942; Moldenke, Alph. List Cit. 1: 35, 40, 43, 80, 175, 220, & 253 (1946), 2: 536, 559, & 572 (1948), 3: 724, 832, 852, 857, & 976 (1949), and 4: 1141. 1949; Moldenke,

Known Geogr. Distrib. Verbenac., [ed. 2], 125 & 174. 1949; Moldenke, Résumé 160 & 440. 1959; Moldenke, Résumé Suppl. 1: 11 & 12. 1959.

This variety differs from the typical form of the species chiefly in its decidedly sharp-acute or acuminate leaf-apex. The branches, branchlets, twigs, peduncles, bractlets, prophylla, and fruit are also more plainly and regularly white-pulverulent. The petioles are quite uniformly very short, being only 1-6 mm. in length.

The type of the variety was collected by R. K. Bhide in the creek near Boriwli station on the B. B. & C. I. Railway, Salsette Island, Konkan, Bombay, India, on April 4, 1904, and is deposited in the herbarium of the Royal Botanic Gardens at Kew. It had previously been misidentified as A. alba Blume and as A. officinalis L. Gammie states that the fruit is "yellow, quite smooth and polished". The fruit, insofar as I have observed it, is not beaked and is precisely similar to that seen in Stapf's A. sphaerocarpa. It has been collected in anthesis from March to May, and in fruit in August.

The H. H. Rich 798 collection is anomalous in having narrower and less sharply acute leaf-blades and less puberulence throughout, the puberulence being of a more sordid-gray color. One of the Gammie specimens shows only germinating seeds.

In all, 28 herbarium specimens, including the type, and 5 mounted photographs, have been examined.

Citations: PAKISTAN: Sind: Hooper 38716 (Cl, Cl), 38759 (Cl, Cl). INDIA: Bombay: E. de Beck s.n. [Poona] (V); J. Blakesley s.n. [seashore near Bombay, May 1928] (K); Burkill 15781 (Cl), 30185 (Cl); Gammie s.n. [Bassein, Aug. 1905] (Bm, K, K, K, K, K, N--photo, Z--photo); Haines 3461 (K); Hugel 2322 (V); Meebold 16507 (Cl, S); Proshad 30134 (B, Cl); H. H. Rich 798 (K); C. Ritchie s.n. [April 1854] (Ed); Stocks 318 (Cl, Cl); Woodrow 5 (Cl). State undetermined: Heyne 1814 (B). SALSETTE ISLAND: Bhide s.n. [Boriwli, 4-4-1904] (K--type, Mi--photo of type, N--isotype, N--photo of type, Z--photo of type).

AVICENNIA MARINA var. ANOMALA Moldenke, Geogr. Distrib. Avicenn. 35, nom. nud. (1939), Phytologia 1: 411. 1940.

Literature: Moldenke, Geogr. Distrib. Avicenn. 35. 1939; Moldenke, Phytologia 1: 411. 1940; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 70 & 86. 1942; Moldenke, Alph. List Cit. 1: 270. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 156 & 174. 1949; Moldenke, Phytologia 3: 381 & 382. 1950; Moldenke, Résumé 211 & 440. 1959.

This variety differs from the typical form of the species in its attenuated inflorescences with scattered or opposite pairs of flowers.

The type of the variety was collected by Diedrich Henne and Carl Wilhelmi on Low Island, Queensland, Australia, and is deposited in the Th. Bernhardi Herbarium at the Botanisches Museum in Berlin. In my original description, in Phytologia 1: 411 (1940),

I stated that Low Island was apart of Tasmania. I thought at that time that it was the Low Island which is east of Clarke Island in the groups of Flinders, Cape Barren, and Clarke islands north of the northeastern extremity of Tasmania, separated from the mainland of Tasmania by Banks Strait. Actually, Henne & Wilhelmi never collected in that area. The type locality for the variety is the Low Island north of Port Douglas, Queensland.

In regard to the reports sometimes seen that Avicennia occurs in Tasmania, I quote from a letter received by me on July 27, 1951, from my friend and colleague, Winifred M. Curtis, of the University of Tasmania at Hobart. She says "Avicennia does not occur in Tasmania or adjacent islands, the nearest locality is in Victoria, then further north, in New South Wales. But Ronald Gunn, an early colonist who collected assiduously and sent to Bentham much material used in the 'Flora Australiensis', wrote the following note on a sheet of Myoporum serratum: 'called in this colony MANGROVE'. Enquiry among some of the older settlers in Tasmania shows that the name 'Mangrove' is still used in this way."

In all, 2 herbarium specimens, including the type, and 3 mounted photographs have been examined.

Citations: LOW ISLAND: Henne & Wilhelmi s.n. [Herb. Bernhardi] (B--type, N--isotype, N--photo of type, S--photo of type, Z--photo of type).

AVICENNIA MARINA var. RESINIFERA (Forst.) Bakh., Bull. Jard. Bot. Buitenz., sér. 3, 3: 210--211, pl. 16, fig. a & d--j. 1921.

Synonymy: Avicennia resinifera Forst., Plant. Escul. Ins.

Ocean. Austr. 72. 1786 [not A. resinifera Griff., 1854]. Avicennia tomentosa Sieber (in part) ex Presl, Bot. Bemerk. 99, in syn. 1814 [not A. tomentosa Blanco, 1845, nor Blume, 1918, nor Jacq., 1760, nor L., 1826, nor L. & Jacq., 1783, nor G. F. W. Mey., 1818, nor Nutt., 1947, nor Nutt. & Br., 1832, nor Roxb., 1835, nor Schau., 1940, nor Sw., 1864, nor Vahl, 1921, nor Weigelt, 1851, nor Willd., 1822]. Avicennia tomentosa var. australasica Walp., Repert. 4: 133. 1845. Avicennia tomentosa R. Br. ex Schau. in Mart., Fl. Bras. 9: 306, in syn. 1851. Avicennia resinosa Forst. ex Moldenke, Prelim. Alph. List Invalid Names 6, in syn. 1940. Avicennia officinalis var. resinifera Biswas, in herb.

Literature: Forst., Plant. Escul. Ins. Ocean. Austr. 72. 1786; Forst., Fl. Ins. Austr. Prod. 45. 1786; J. F. Gmel. in L., Syst. Nat., ed. 13, 2 (2): 963. 1791; Willd., Sp. Pl. 3 (1): 395. 1801; Pers., Syn. Pl. 2: 143. 1807; R. Br., Prodr. Fl. Nouv. Holl., ed. 1, 1: 518. 1810; Lam., Encycl. Méth. Bot. Suppl. 1: 539. 1810; Rich., Voy. Astrolabe 195. 1832; Decaisne, Herb. Timor 74. 1836; Presl, Bot. Bemerk. 99. 1844; Miq. in Lehm., Pl. Preiss. 1: 353. 1845; Walp., Repert. 4: 133. 1845; W. Griff., Trans. Linn. Soc. Lond. Bot. 20: 6 & 7, pl. 1, fig. 3--5 & 13. 1846; W. Griff., Ann. Sci. Nat. Bot., sér. 3, 7: 11 & 12, pl. 1, fig. 3--5 & 13. 1847; Schau. in Mart., Fl. Bras. 9: 306--308. 1851; Schnitzlein, Iconogr. 2: pl. 137**. 1856; Miq., Fl. Ind. Bat. 2: 912. 1856;

Hook., Handb. New Zeal. Fl. 224 (1864) & 772. 1867; Palmer, Proc. Roy. Soc. N. S. Wales 17: 94. 1884; Kirk, For. Fl. New Zeal. 271--272, pl. 130. 1889; Jacks., Ind. Kew. 1: 254. 1893; Laing & Blackwell, Pl. New Zeal., ed. 1, 139, 253, & 351--361, fig. 114--118 (1906) and ed. 2, 353, 355, 357, & 359. 1907; T. G. B. Osborn, New Phytologist 13: 112 & 121, pl. 1, fig. 1. 1914; Ostenfeld, Dansk. Bot. Arkiv 2 (8): pl. 1, fig. 1. 1918; Cockayne, Distrib. Veg. Fl. N. Zeal. 14. 1919; Cockayne, N. Zeal. Pl., ed. 2, 35. 1919; A. A. Hamilton, Proc. Linn. Soc. N. S. Wales 44: 463 & 470--472, pl. 26, fig. 20. 1919; Bakh., Bull. Jard. Bot. Buitenz., sér. 3, 3: 203, 204, & 210--211, pl. 16. 1921; Lam & Bakh., Nova Guinea 14: 172. 1924; Cheeseman, Man. N. Zeal. Fl., ed. 2, 765. 1925; Laing & Blackwell, Pl. N. Zeal., ed. 3, 354 & 356--366, fig. 128--121. 1927; Ridl., Dispersal Pl. 310. 1930; Crevost & Pételot, Bull. Econom. Indochine 37: 1297. 1934; Moldenke, Alph. List Common Names 20, 22, & 23. 1939; Moldenke, Geogr. Distrib. Avicenn. 33--35. 1939; Moldenke, Prelim. Alph. List Invalid Names 5 & 6. 1940; Laing & Blackwell, Pl. N. Zeal., ed. 4, 373--384, fig. 140--143. 1940; Kanehira & Hatusima, Bot. Mag. Tokyo 56: 112. 1942; Moldenke, Alph. List Invalid Names 5. 1942; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 64--66, 68--70, & 86. 1942; Moldenke, Phytologia 2: 92. 1944; Moldenke, Alph. List Cit. 1: 4, 16, 27, 29--31, 34, 37, 38, 46, 50, 51, 59, 71, 89, 94, 100, 113, 115, 117, 119, 120, 136, 141, 160, 161, 166, 170, 208, 210, 212, 226, 227, 233, 235, 249, 250, 270, 275, 277, 286, 295, & 312 (1946), 2: 354, 361, 416, 433, 435, 439, 449, 456, 482, 496, 500--503, 537, 538, 557, 558, 572, 580, 593, 602, 614, 639, & 644 (1948), 3: 655, 685, 699, 702, 703, 724, 739, 747, 750, 752, 759, 761, 776, 782, 793, 811, 813, 827, 828, 841, 842, 852, 856, 865, 906, 926, 935, 941, & 957 (1949), and 4: 984, 987, 997, 1010, 1017, 1021, 1054, 1093, 1094, 1119, 1123, 1168, 1175, 1205, & 1223. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 144, 146--148, 150--152, 155, 156, & 174. 1949; H. N. & A. L. Moldenke, Anal. Inst. Biol. Mex. 20: 3. 1949; Moldenke, Phytologia 3: 381 & 382 (1950), 4: 88 (1952), and 4: 193 & 195--197. 1953; Moldenke, Résumé 187, 189, 194, 196, 198, 200, 204, 205, 207, 211, 236, & 440. 1959; Moldenke, Résumé Suppl. 1: 14 & 15. 1959.

Illustrations: Kirk, For. Fl. N. Zeal. pl. 130. 1889; Laing & Blackwell, Pl. N. Zeal., ed. 1, fig. 114--118 (1906) and ed. 2, 353, 355, 357, & 359. 1907; T. G. B. Osborn, New Phytologist 13: pl. 1, fig. 1. 1914; Ostenfeld, Dansk. Bot. Arkiv 2 (8): pl. 1, fig. 1. 1918; Cockayne, N. Zeal. Pl., ed. 2, 32. 1919; A. A. Hamilton, Proc. Linn. Soc. N. S. Wales 44: pl. 26, fig. 20. 1919; Bakh., Bull. Jard. Bot. Buitenz., sér. 3, 3: pl. 16, fig. a & d--j. 1921; Laing & Blackwell, Pl. N. Zeal., ed. 3, fig. 128--131 (1927) and ed. 4, fig. 140--143. 1940.

This variety differs from the typical form of the species in its branches, branchlets, and twigs being much more uniformly and regularly glabrous or subglabrate and very shiny, purple or black in drying, usually pulverulent only at the nodes or on very young parts, the leaf-blades more decidedly long-acuminate at the base, regularly very densely impressed-punctate above,

and mostly much more sordid, yellowish, or fulvous beneath; the axillary inflorescences often paired, frequently subtended by large foliaceous bracts; the peduncles often greatly abbreviated; and the bractlets, prophylla, calyx, and rachis more densely pubescent or even velutinous with brownish or fulvous-flavitious hairs.

It is said by collectors to be a slender tree, to 23 m. tall, with a bole to 6.5 m. tall clear of branches, to 30 cm. in diameter at breast height, surrounded by slender erect pneumatophores; bark about 3 mm. thick, the outer bark gray or pinkish-brown, greenish-brown when rubbed, fairly smooth, the inner bark green on the back and white within; wood straw-colored; flowers honey-scented; corolla yellow or orange; fruit pointed at the apex, more or less heart-shaped, very pale-brown, about 3 cm. long and 2.2 cm. wide at the widest part. The leaf-blades vary from broadly elliptic (as in the so-called var. intermedia and some specimens of A. sphaerocarpa) and rounded at the apex to narrow and greatly elongate and sharply acute at the apex. The narrow and greatly elongate material closely approaches A. eucalyptifolia and may more properly belong there. Bakhuisen in Bull. Jard. Bot. Buitenz., sér. 3, 3: 210 (1921) reduces A. eucalyptifolia, A. officinalis var. eucalyptifolia, A. mindanaense, and A. alba var. acuminatissima to synonymy under A. marina var. resinifera. However, I regard A. mindanaense as typical A. marina, and separate the others as A. eucalyptifolia. On pages 210--211 he describes var. resinifera, but his description is based on material which I regard as representing not only this variety [the Atje, Jaheri, and Rockhampton specimens], but also some which is typical A. marina [Elmer 11990, in part, and Curran 17337] and some which is A. eucalyptifolia [Elmer 11990, in part, Robinson 1862, Branderhorst 227, Koch s.n., and Versteeg 1893]. His description and discussion are as follows: "Folia elliptico-oblonga, 5 multoties longiora, utrinque attenuata subtus viridi-canescens, 7--16.5 cm. longa, infra medium 1.5--3.5 cm. lata; petiolo 1--1.5 cm. longo. Panicula parva, foliata, non vix ramosa, bracteolis subfoliaceis saepe involutis. Inflorescentia partialis compacta, cephaloidea vel pyramidata, 0.5--1.2 cm. longa, 2--12 flora. Flores expansi mediocres, 0.5--0.7 cm. longi, 0.5--0.7 cm. diam. Corolla tubo 0.3 cm. longo; laciniis 2.5--3 cm. longis, 0.2--0.25 cm. latis. Stamina filamentis 0.20--0.22 cm. longis; antheris 0.10--0.12 cm. diam. Pistillum corollae tubo aequale vel vix longius, conspicuum. Ovarium brevi tomentosum; stylo brevi; stigmatibus post corollae lapsum exserto. Fructus ovoideus. -- Cetera varietate [alba] similia. Remarks. Description exclusively made after dried material. -- This variety approaches the var. alba (Bl.) Bakh. because of the shape of the leaves; but it differs from it especially in having the axillary and terminal inflorescences consisting of capitules; the bracts are less developed, generally curved, little leaves. [See also H. J. Lam. Verb. pl. III fig. 1, p-t]. The appearance of these curved

bracts is indeed a characteristic of the entire capitata group. — The name A. resinifera was given by Forster on account of the supposed formation of resin in these trees. According to Cheeseman, this affirmation is erroneous, and this resin must have been the edible kaurigum of the Maoris, which comes from the Agathis australis Salisb. (Cowriespruce). The Avicennia trunk secretes in fact some resin, possibly only by a wound, as I observed myself in Tandjong-Priok with the var. intermedia (Griff.) Bakh. — Heyne in Nutt. Plant. Ned. Ind. IV [1917] p. 124, speaks on Boorsma's authority, of tough, odoriferous and bitter resin which is used to prevent pregnancy, a remedy which is supposed to be harmless also when used continuously. Arabian writers too, speaking of Avicennias along the coast of Arabia, mention very often indeed the resin formed by these trees." He gives as geographic distribution of the variety: Victoria, New South Wales, Queensland, New Zealand, New Caledonia, Galapagos Islands, New Guinea, Amboina, Timor, Biliton, Mindanao, and Panay. He adds that "According to Bailey the wood is strong, hard and durable, for which reason it is used in Australia for different purposes; besides the fruit is eaten toasted. The planting of it is recommended against coast erosion." His Galapagos record is, of course, erroneous and applies to A. germinans (L.) Stearn. The Amboina record, also repeated by me in some of my previous publications, is based on C. B. Robinson 1862, which I now regard as A. eucalyptifolia.

In previous publications I regarded A. mindanaense and A. mindanaensis as synonyms of A. marina var. resinifera, but I now regard the collection on which these names are base as being typical A. marina. Similarly, I previously annotated Copeland 558, Elmer 11990, and Merrill 1179, 2413, and 2585, all from the Philippine Islands, as being var. resinifera, but I now regard them as typical A. marina. Miquel, in Fl. Ind. Bat. 2: 912 (1856), places A. resinifera Forst. as a synonym of A. officinalis L. In fact, specimens of var. resinifera have been abundantly misidentified in herbaria as A. officinalis L., A. tomentosa L., and even as Clerodendrum inerme (L.) Gaertn., Vitex trifolia L., Vitex littoralis A. Cunn., and "Caprifoliaceae".

The Koch s.n. collection from Papua seems definitely to consist of a mixture of var. resinifera and A. eucalyptifolia. Kanehira & Hatusima, in their 1942 reference cited above, cite their no. 11179 from New Guinea as var. resinifera, but this collection has not as yet been seen by me.

According to various collectors, var. resinifera inhabits muddy shores. It is said to be common in dense mangrove formations on river margins in Queensland, on mudflats along tidal rivers in New South Wales, and to be common on the seashore and in the muddy parts of sea lagoons on Malaita Island. White says that it is found "along the harbour front, a little below high-tide level; tree about 30 feet tall; leaves dark green above, whitish underneath; flowers orange, honey-scented." It has been collected in

anthesis in March, September, and October, and in fruit in March and August. Campania 127 has its leaves much galled.

Walpers' original description of his A. tomentosa var. australasica is worth repeating here: "Folia ovali-lanceolatis acuminatis vel obtusis longissimus in petiolum attenuatis, supra nitidis, infra glaucescenti-tomentosis. Folia 2—3—3.5 pollicaria, pollicem lata, basi longe attenuata, petiolis 6—9 lin. vel etiam pollicaribus. A. resinifera Forst.....Crescit in Nova Hollandia." Apparently this is merely a new name and status for Forster's A. resinifera and therefore based on Forster's type. If this is so, then under a strict interpretation of the present International Rules, the epithet "australasica" would have to be accepted as the valid name for this taxon since it is the earliest name applied to it in the varietal category. The name of the plant would then become Avicennia marina var. australasica (Walp.) Moldenke, comb. nov. [Avicennia tomentosa var. australasica Walp., Repert. 4: 133. 1845].

The binomial, A. tomentosa Sieber, is based in part (p. 99) on Sieber Fl. Nov. Holl. 268, and insofar as that material is concerned is therefore a synonym of var. resinifera. The remainder of the material to which Sieber applied this binomial (pp. 98—99) is his Fl. Mart. 318, which is A. germinans (L.) Stearn. The Barclay s.n. collection from Celebes was annotated by Biswas as "A. officinalis var. resinifera", but I cannot find that he ever validly published this trinomial combination.

The Oldfield s.n. and Henne & Wilhelmi s.n. collections from Low Island are actually not from the Low Island which is just north of the northeast extremity of Tasmania, as previously thought by me, but are from the Low Island north of Port Douglas, Queensland.

A. marina var. resinifera has quite a few common and vernacular names, among which are "Australian grey mangrove", "bootharoo", "brappat", "bu-bula", "daon kaju buluh ajam", "egate", "e-pum eran", "grey mangrove", "kaloh", "kum moo-roo", "Malacca baen", "manaoua", "manawa", "mangi-mangi", "mangrove", "native mangrove", "New Zealand mangrove", "parpoon", "rhai-ite", "sotan", "tagon-tagon", "tchunt-chee", and "white mangrove". It is worth noting that the name "mangrove" as also applied to all members of the genus and to A. germinans in particular. "White mangrove" is applied also to Laguncularia racemosa Gaertn. f. The "maraban" mentioned by Bakhuizen on page 211 of his 1921 work, cited above, applies to typical A. marina.

Stapf considered the taxon being discussed here as sufficiently distinct to warrant a specific name, and so annotated the Kew specimens. Seedlings may be seen on the Gunn specimen at Kew. The surname of the collector, Jean Armand Isidore Pancher, is misspelled "Pansher" in the Leiden herbarium.

Hooker, in his Handb. N. Zeal. Fl. 224 (1864), records "A. officinalis" (his name for A. marina var. resinifera) from a Chatham Island on the authority of Dieffenbach. Cheeseman, in

his *Man. N. Zeal. Fl.*, ed. 2, 765 (1925), asserts that this is undoubtedly an error, since *Avicennia* does not occur on Chatham Island. Dieffenbach's plant was probably a sterile specimen of *Olearia traversii* F. Muell. in the *Carduaceae*. *A. germinans* (L.) Stearn, however, does grow on the Chatham Island in the Galapagos group and specimens of it from there have been misidentified as *A. officinalis*. It is probable that the "Galapagos Islands" record given by Bakhuizen van den Brink for *A. marina* var. *resinifera* probably stems back to this confusion of islands.

Laing & Blackwell, in their 1927 reference cited above, point out that "Mangroves have been generally regarded as the pariahs of the forest and *A. officinalis* [that is, *A. marina* var. *resinifera*] has not escaped the usual condemnation. Thus, the following impassioned but somewhat inaccurate description of it occurs in one of the earliest New Zealand novels:— 'Oh! those mangroves. I never saw one that looked as if it possessed a decent conscience. Growing always in shallow stagnant water, filthy black mud, or rank grass, gnarled, twisted, stunted, and half bare of foliage, they seem like crowds of withered, trodden down old criminals, condemned to the punishment of everlasting life'....Doubtless much of the evil reputation of the mangrove forest is due to the fact that, to its presence, has long been erroneously attributed the prevalence of malaria in tropical river estuaries. Miasmatic vapours were supposed to arise from the pestilential mangrove swamps, and spread their contagion around....Fortunately, New Zealand does not possess the malaria carrying mosquito (*Anopheles*), and so her mangrove forests, in spite of their foul appearance, are no more dangerous to human life than any other part of the country. Indeed, at high tide, a mangrove swamp is often a pleasant place to punt in, for then the somewhat sickly odour of the mud, is replaced by the fresh smell of the sea.....The twisted and gnarled stems and roots give to the tree an unwarranted appearance of age, so that even the youngest mangrove looks old. Barnacles and oysters fix themselves upon the roots which are uncovered by the withdrawal of the tide; eels wriggle in and out of their holes, and the mass of fibrous rootlets which form a mat beneath the mud, provides dwelling-places for innumerable mud-coloured crabs. These are sought after, not only by the sober-hued wekas, but also by the beautiful kingfishers."

Miss L. B. Moore, in a letter to me dated August 6, 1959, states that "there is no reason to believe that *A. Richard* was ever in this country, and the Fosters visited only two South Island localities where it seems quite impossible that they could have seen mangroves." It would appear, therefore, that the specimens cited to these collectors below were probably sent to them by other collectors. The Banks & Solander, Bennett, Berggren, Collector undesignated, Cunningham, Drake, Forster, Hillebrand, Hooker, Hügel, Lesson, Lynd, Meebold, Moricand, Myers, Philson, Raoul, Richard, and Wilkes specimens cited from New Zealand's North Island below do not state on their labels on what island they were collected. However, Miss Moore says it can be safely assumed that all came from North Island.